FIRST ANNUAL REPORT:

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AMERICAN BOTTOMS ARCHAEOLOGY

JULY 1, 1961 — JUNE 30, 1962

by

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A report of research under the auspices of
The National Science Foundation (G17922)
And the Illinois Archaeological Survey

Based upon field excavations carried out under the auspices of
The Bureau of Public Roads, U. S. Department of Commerce
The Division of Highways, Illinois Department of Public
Works and Buildings

The Illinois Archaeological Survey
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University of Illinois, Urbana, Illinois

Cooperating Institutions;

The Illinois State Museum
Springfield, Illinois

The University of Illinois
Urbana, Illinois

Southern Illinois University
Carbondale, Illinois

ILLINOIS HISTORICAL SURVEY

FIRST ANNUAL REPORT:

AMERICAN BOTTOMS ARCHAEOLOGY

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KEY

CITIES

1 ALTON, ILLINOIS
2 BETHALTO
3 EAST ALTON
4 WOOD RIVER
5 ROXANA
6 HARTFORD
7 POAG
8 NAMEOKI
9 GRANITE CITY
10 MADISON
11 VENICE
12 BROOKLYN
13 NATIONAL CITY
14 FAIRMONT CITY
15 COLLINSVILLE
16 CASEYVILLE
17 WASHINGTON PARK
18 EAST ST LOUIS
19 BELLEVILLE
20 CAHOKIA
21 EAST CARONDELET
22 DUPO, ILLINOIS

CITY LIMITS

SCALE

0 1 2

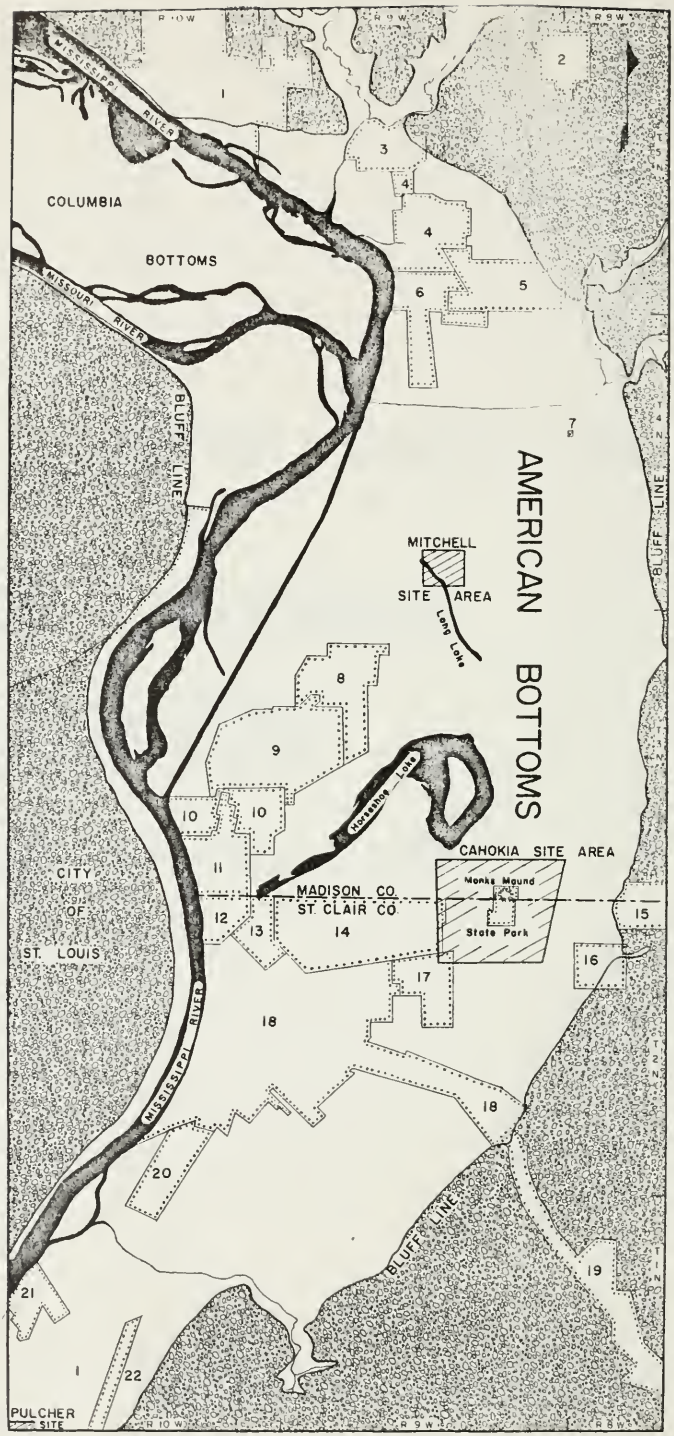

FIGURE 1

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I

INTRODUCTION

This report summarizes the findings accruing from the first year of research under National Science Foundation Grant 17922. This grant was given to the Illinois Archaeological Survey for the purpose of analyzing data that was accumulating on one of the most significant archaeological areas in North America. This area, known in the Midwest as the American Bottoms, is a large pocket of fertile land in the Mississippi river valley centering around the area of St. Louis. In prehistoric times, as it is today, this was a large population center.

The American Bottoms area is best know archaeologically for the site of Cahokia or Monks Mound. The site, known by either of these names, is a large cluster of platform mounds of Mississippian culture located in the central portion of the American Bottoms (see Figure 1). Central to this large mound group is Monks Mound itself which covers about 16 acres and rises over 100 feet above the valley floor. Scattered throughout the American Bottoms are archaeological sites composed of mounds and habitation areas that relate culturally to this central group. The Mitchell Group on the north near Granite City, Illinois, and the Pulcher Group on the south near the town of Dupo, Illinois, seem to represent the outliers of this occupation and demark the zone of population concentration (see Figure 1).

It has been known for many years that this was an area of significance archaeologically but its tremendous size and the lack of money for field work have kept archaeologists from detailed investigations. Moorehead (1928) did some cursory field work in the area and he was followed by several others in the thirties. Griffin (1949) documented the basic ceramic sequence that had developed out of these studies.

In the past five years there has been an intense campaign of highway construction in this area due to the fact that several of the major east-west and north-south interstate highways of the new Federal highway system cut through the St. Louis area. These modern highways often have right-of-way areas several hundred feet in width. Because of the many other highways, railroads, and streams in this area, and because the interstate highways are all limited access highways, it has been necessary to have large interchanges and overpasses at rather close intervals. These overpasses and interchanges require thousands of cubic yards of fill to raise the elevation of the highway sufficiently to pass over the obstructions. This type of construction has already destroyed completely some archaeological sites.

Fortunately, in Illinois an Archaeological Salvage Program for the Interstate Highway areas had been established before the construction in the American Bottoms area had gotten very far along. This program carried out by the Illinois Archaeological Survey in cooperation with

the U. S. Bureau of Public Roads, United States Department of Commerce and the Division of Highways of the State of Illinois Department of Public Works and Buildings has yielded tremendous quantities of invaluable archaeological data.

This destruction of archaeological sites and the consequent accumulation of data due to the cooperative archaeological salvage program, coupled with the fact of almost daily obliteration of archaeological data due to industrial and suburban expansion in the area, prompted the members of the Illinois Archaeological Survey to request support of the National Science Foundation to gather and analyze the archaeological data before it was completely lost. While reservoirs merely inundate archaeological sites, highway construction and industrial and urban expansion are total destruction in terms of archaeology. Fortunately, the National Science Foundation agreed, and thus was launched a program of an integrated study of the archaeological data from the American Bottoms.

In the Archaeological Salvage Program, the three cooperating institutions carried out field work in different areas of the American Bottoms. The Illinois State Museum Field Parties, under the direction of Warren Wittry, worked in two major areas, known as Tracts 15A and 15B, both within 3000 yards west of Monks Mound. The University of Illinois Field Parties, under the direction of Donald Lathrap and Charles Bareis, worked in the vicinity of the old Powell Mound about two miles west of Monks Mound. The Southern Illinois University Museum Field Parties, under the direction of James Porter, worked at the Mitchell Site about seven miles north of Monks Mound. In the following sections these individuals summarize the material recovered from those excavations. Analysis of these data is really just beginning, so detailed published reports on them must be deferred to a later date.

Under the National Science Foundation grant each of the cooperating institutions undertook to carry out certain specialized research working with materials recovered throughout the American Bottoms. The University of Illinois undertook a study of clay-minerals used in pottery manufacture. This work is reported on by Brian Carss in Chapter III. The Southern Illinois University undertook to establish a pollen laboratory and a lithic laboratory. James Porter reports on the Lithic Laboratory and James Schoenwetter reports on the results of the first year of operation of the Pollen Laboratory in Chapters V and VI. The Illinois State Museum undertook to set up a punch card system of ceramic analysis, and a preliminary report on the success of this venture is given in Chapter IV.

This report summarizes all of the above-mentioned projects and presents some data accruing from these. It should be considered current as of 1 July 1962. Considerable work has been carried out on these projects since then and will be discussed in future reports. This report should be considered informative but not exhaustive.

II

UNIVERSITY OF ILLINOIS PROJECTS

by

Charles Bareis and Donald Lathrap

Processing and Study of Archaeological Materials

Work, under the auspices of the grant, did not begin until September 1, 1961, since one of the principal investigators (Bareis) was engaged in archaeological excavations in the Cahokia area. All archaeological excavations undertaken by the University of Illinois in the American Bottoms during 1960 and 1961 were in the vicinity of the Cahokia Mounds. The specimens obtained from these excavations have been washed and sorted and, with the exception of the Phase 2 (Highway Salvage Exc.) work at site Ms-2-2 (below), they have also been catalogued or otherwise bagged for study and analysis.

The Excavations

1. Ms-2-2, Phase 2 Highway Salvage Excavations. Site area located in Madison County, east of Illinois 111, and ca. 200 yards NE of the old Powell Mound area. Excavated by Lathrap 1960.

2. Ms-2-2, Phase 3 Highway Salvage Excavations. Site area same as 1 (above). Excavations initiated by Lathrap 1960 and completed by Bareis 1960.

3. Ms-2-2, Groves Borrow Pit Excavations. Site area adjacent to and north of 1 and 2 (above). Excavated by Bareis and Lathrap 1960 (assisted by Porter).

4. S-34-1, University of Illinois Field School Excavations. Site area located in St. Clair County on western border of Collinsville Airport property, and ca. one-half mile SE of Monks Mound. Excavated by Bareis 1961.

5. S-34-2, Mound 51, University of Illinois Field School Excavations. Site area located in St. Clair County ca. 100 yards SE of Monks Mound. Excavated by Bareis 1961 (assisted by Porter and Wittry).

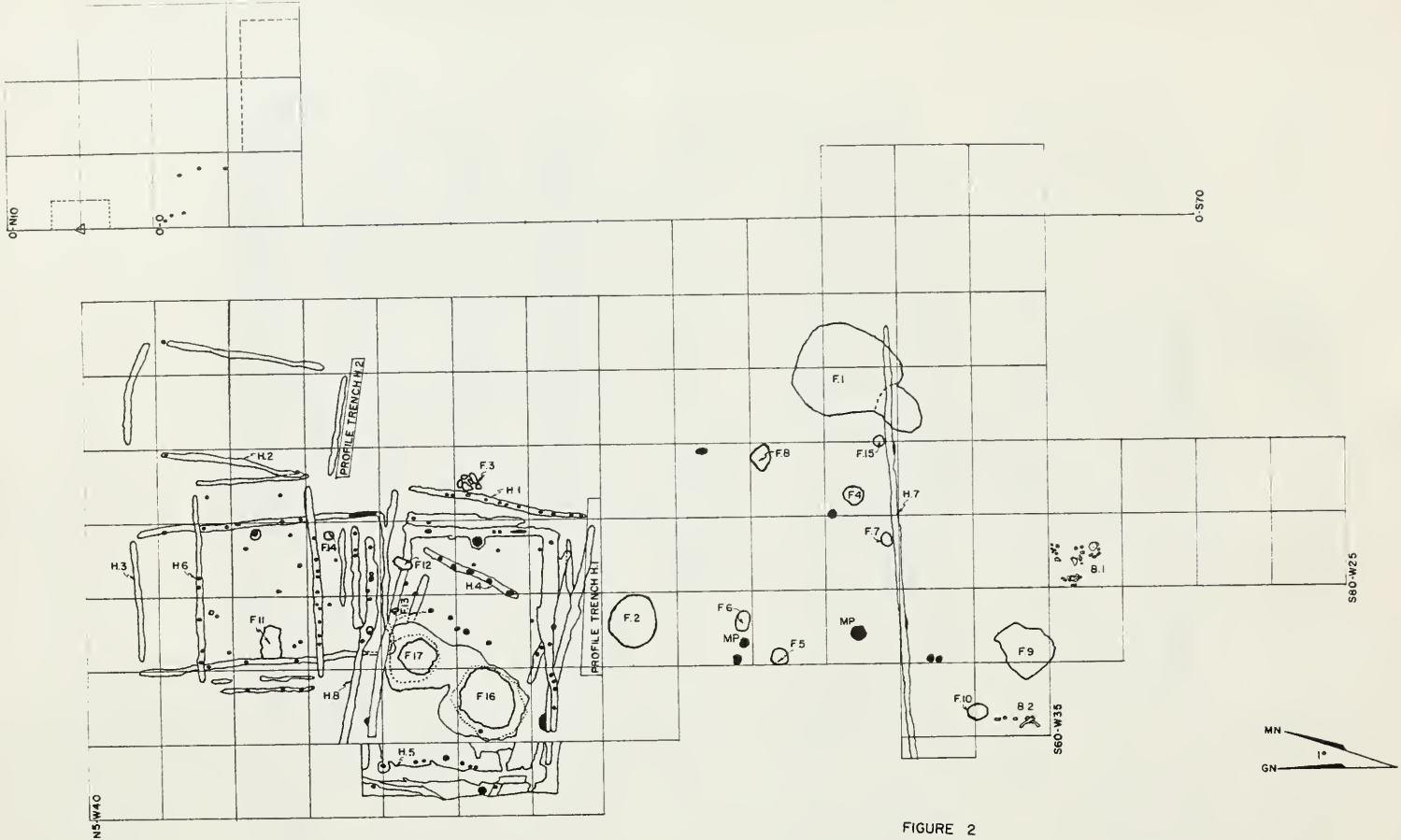


FIGURE 2

LEGEND

[- - -] =BALK

• =POST MOLD

MP• =MODERN POST MOLD

S-34/1
COLLINSVILLE AIRPORT
SITE
BAREIS 6/12/61 - 8/16/61
EACH SQUARE = 5'

Totals From Excavations of Specimens Processed and Features Under Study

(Totals not available for Ms-2-2, Phase 2, and totals for Ms-2-2, Phase 3, in progress.)

Ms-2-2, Phase 3

Specimens	Totals	Features	Totals
Chert Chips	8538	Structures	29
Chipped Chert	3028	Wall Trenches	3
Sherds	12826	Refuse Pits	21
Ground Stone	291	Post Pits	6
Rough Rock	1284	Corn Caches	2
Limestone	2900	Fireplaces	10
Animal Bone	591+	Misc.	9
Plant	71+		80
Clay	908		
Misc.	263		
	30700+		

Ms-2-2, Groves Borrow Pit

Specimens	Totals	Features	Totals
Chert Chips	1820	Structures	6
Chipped Chert	1089	Refuse Pits	155
Sherds	2862	Corn Caches	1
Ground Stone	50	Fireplaces	2
Rough Rock	502	Burials	2
Limestone	1338	Misc.	11
Animal Bone	1107+		177
Plant	+		
Clay	209+		
Shell	48+		
Human Bone	+		
Misc.	4		
	9029+		

S-34-1

Specimens	Totals	Features	Totals
Chert Chips	6156+	Structures	8
Chipped Chert	1033	Refuse Pits	6
Sherds	4406	Corn Caches	9
Ground Stone	77	Rock Features	2
Rough Rock	502	Burials	2
Limestone	562		27

S-34-1--(Continued)

Specimens	Totals	Features	Totals
Animal Bone	183+		
Plant	+		
Clay	147		
Shell	5		
Human Bone	48+		
Misc.	77+		
	13196+		

S-34-2, Mound 51

Specimens	Totals	Features	Totals
Chert Chips	210	Refuse Pits	5
Chipped Chert	72	Wall Trench	1
Sherds	691	Fireplaces	2
Ground Stone	3	Misc.	7
Rough Rock	121		15
Limestone	409		
Animal Bone	130		
Clay	28		
Shell	12		
Human Bone	7		
Bone Artifacts	8		
Misc.	11		
	1702		

A number of the limestone and rough rock specimens recovered during the excavations have been transferred to the Southern Illinois University Museum for incorporation in the lithic project. Likewise, some of the 156 soil samples collected during the excavations have also been transferred for incorporation into the pollen studies. Six of the 152 charcoal samples obtained from the sites were processed for radiocarbon dating by the University of Michigan (below).

Shell Analysis: Several conch shells obtained from cuts by heavy machinery on the west side of the Alton and Southern Railroad during the 1960 Phase 3 excavations at site Ms-2-2 were submitted for identification to Dr. Fritz Haas of the Zoology Department of the Chicago Natural History Museum. The shells have been identified as *Busycon perversum* and are from the eastern coast of the United States between Cape Hatteras and Florida.

Ceramic Analysis: The ceramic analysis in progress at the University of Illinois during 1961-62, under the supervision of Lathrap, has the following aims:

1. The several ceramic complexes at Cahokia will be defined as total cultural patterns on the basis of the modes present (Qualitative Attributes in Spaulding's terminology) and the rules for mode combination. Such a pattern will be determined

for each of the synchronic units present. In order to facilitate the study of the rules of mode combination, I.B.M. cards will be used.

2. Once these several cultural patterns have been defined, they can be ordered temporally on the basis of the considerable stratigraphic data and the several C 14 dates available. Once this ordering is made, a comparison of these several cultural patterns should yield a very clear picture of ceramic change at Cahokia, not in terms of quantitative shifts in gross, rather ill-defined types, but in terms of the shift in the nature of individual modes, the appearance or disappearance of individual modes, or the appearance or disappearance of particular mode combinations.

3. The end result of these procedures should be a master chronological chart for the ceramics in which the co-occurrence and temporal range of all recognizable modes and temporal variants of modes are clearly stated. Such a chart would not only serve as a powerful dating tool but would permit meaningful discussions of culture change at Cahokia in terms of operationally defined units. The form of this master chart would be very similar to the charts of qualitative seriation discussed by Rowe (Archaeological Dating and Cultural Process. Southwestern Journal of Anthropology, Vol. 15, No. 4, pp. 317-24, 1959).

Radiocarbon Dating:* Six radiocarbon samples, obtained from excavations in two areas of the Cahokia site during 1960-1961, were processed by the Phoenix Project Radiocarbon Laboratory at the University of Michigan. Submitted by Charles J. Bareis, Department of Anthropology, University of Illinois.

	Ms-2-2, Subseries	
	B. P.	A. D.
M-1292	1055±150	755-1055
M-1293	1190±150	620-920
M-1294	1125±150	685-985
M-1295	1915±150	105B.C.-195A.D.
	S-34-1 Subseries	
M-1296	725±150	1085-1385
M-1297	675±150	1135-1435

*All radiocarbon determinations are discussed in detail in Chapter VII of this report.

New Excavations

During the summer of 1961 archaeological excavations were conducted by Bareis on the western margin of the Collinsville Airport property (S-34-1) southeast of Monks Mound. The area of excavation was located on the eastern slope of a ridge with an elevation of 415' above sea level. The surface of this portion of the airport property and the large Listerman tract to the west, extending from U.S. 40 south, is replete with evidence of the Mississippian occupation at Cahokia.

The primary purpose of the work during 1961 was to test an area well beyond the rights-of-way of Federal Aid Interstate Highways in order to obtain additional information pertaining to the settlement plan in the central Cahokia area. The field party, consisting of 8 University of Illinois students, exposed a tract of approximately 3200 square feet which contained a large quantity of archaeological specimens and 27 features.

The eight structures excavated at the site were all wall trench houses, probably occupied by nuclear families. It is particularly significant that seven of them were either superimposed or placed adjacent to one another in an area of 35' x 35'. Five of the houses were oriented with the long axis east-west, and two were constructed with the long axis north-south. A radiocarbon date of 725±150 years ago has been obtained for one of the latter.

The compact arrangement of the houses is indicative of an intensive reoccupation of areas suitable for agricultural activity. This pattern is quite similar to the type of settlement plan exposed by the University of Illinois and Illinois State Museum Highway Salvage Excavations in other sections of the Cahokia site during 1960 and 1961 (ISM).

Another project undertaken by the University of Illinois during the summer of 1961 was the testing of Mound 51 (S-34-2) southeast of Monks Mound. Since Mound 51 has been gradually removed during the past two years for subdivision purposes, it was deemed necessary to undertake excavations in order to obtain archaeological information before complete destruction.

The excavations were conducted by Bareis, who was assisted by Porter and Wittry on weekends when their labor crews were not working. A 60-foot test trench 10 feet wide was established across the top of the mound. This trench was excavated to a depth of approximately five feet. The testing indicated that the mound had been constructed in at least two sand-filled stages. The most significant features excavated in the mound were two large fireplaces located on the western slope which was under constant destruction by a heavy equipment operator.

Clay Minerals Project

Work on the clay minerals project was initiated in September, 1961, under the supervision of Bareis with the analyses undertaken by Mr. Walter Parham of the Illinois State Geological Survey. Mr. Parham worked on the project until February, 1962, and during this time analyzed 28 pottery

and raw clay specimens. During this time the Illinois Geological Survey kindly provided their facilities and Mr. Parham's working time for the project.

Subsequent to February, 1962, the project was continued by Mr. Brian Carss of the Department of Geology. By June of 1962, Mr. Carss had analyzed an additional 47 samples. The 75 samples currently processed were submitted by the three participating institutions in the Grant. Breakdown of the number of samples submitted by each institution is as follows: UI, 37; SIU, 18; ISM, 20.

Following is a progress report by Mr. Carss on the clay minerals project, and a comment on points 1 and 2 in the Conclusion and Recommendations section of his report by Mr. James Porter of the Southern Illinois University Museum.

III

PROGRESS REPORT ON THE CLAY MINERAL ANALYSES OF POTTERY AND SOILS RECOVERED FROM THE AMERICAN BOTTOMS

by

Brian Carss
Department of Geology, University of Illinois

Introduction

To date approximately 75 different soils and pottery fragments have been analyzed for their clay mineralogical content by means of X-ray Diffraction analysis using a General Electric X/R D-4 Diffractometer and a Phillips recorder.

Experimental Technique

Each specimen was first crushed and ground to pass a 200 mesh sieve. A small part of this specimen was placed in a holder and an X-ray powder diffraction obtained. A second part, approximately 3 grams, was placed in a 50 mls. beaker which was then half filled with distilled water, stirred for two minutes, and then allowed to stand for one hour. A small tube was inserted to a depth of 1 cm. and about 5 mls. withdrawn. This suspension was then flowed onto a glass slide and allowed to dry overnight. This is the standard procedure for the preparation of an oriented aggregate. Three slides of each specimen are prepared, so that they could be subjected to various treatments before X-raying.

One slide was X-rayed without any further treatment, to determine the major clay mineral constituents. The second slide was placed in an atmosphere of ethylene glycol for approximately 24 hours. This has the effect of expanding the montmorillonoid minerals to a basal d-spacing of 17Å. This test is a diagnostic one. The third slide was treated with concentrated hydrochloric acid or, in some of the earlier specimens, heated to approximately 550°C for a period of 30-45 minutes. This is a diagnostic test for distinguishing between Kaolinite and Chlorite.

One sample (CS-38) was taken and placed in a specially designed furnace so that it could be continuously X-rayed as the temperature was raised. The aim of this experiment was to try and determine the sequence of changes that take place in the mineralogy of a soil as the temperature is increased. The sequence of changes that do take place are as follows:

a) Up to approximately 400°C, organic constituents are burned.

b) 400°-550°C, destruction of the kaolinite structure.

c) Up to 950°C, gradual destruction of the illite structure. This gradual destruction can be followed on the diffractometer trace as a steady decrease in the first order reflection intensity and a loss of the sharpness and symmetry of the reflection.

d) Above this temperature there is the beginning of the development of the high temperature phases. This last stage requires rather sophisticated firing techniques, and from examination of the diffractometer traces, no high temperature phases have been developed.

Mineralogy of the Soil Samples

By far the most dominant mineral present in the soil is quartz, ranging in size from a coarse sand to what is called amorphous silica. This latter shows on the diffractometer traces as a high background intensity in the approximate position of the first order reflection for quartz. Associated with the quartz and usually in very minor quantities is cristobalite. In the majority of cases it is just detectable, so that there is probably less than 1 per cent, as this is about the limit of detection of the X-ray machine. The second major non-clay mineral group present is that of the feldspars, with the plagioclase feldspars dominating over the potassium feldspars, and in general these minerals tend to be well defined crystals, as they rarely appear present in the less than 2 micron fraction. The third non-clay mineral group is that of the carbonates. Their presence appears to be quite random and in the soils is probably directly connected to the amount of shell material that has been added.

In the sherds, calcite and dolomite commonly occur in pieces that can be readily picked out with a needle. However, further investigation shows that the calcium carbonate has been dehydrated to calcium oxide and then slaked again to calcium hydroxide and then back to calcium carbonate. These series of reactions verify a temperature of firing greater than 650°C. (CS-73 was the specimen used in this investigation.)

The clay mineral composition of the soils remains reasonably constant in variety in all the samples. The soils contain the following clay minerals in order of abundance: Montmorillonite, Illite, Kaolinite, and some Chlorite, the first being by far the most abundant.

Mineralogy of the Sherds

The mineralogy of the sherds is very much simpler than that of the soils, as the temperatures reached in firing have been great enough to completely collapse most of the montmorillonites. Illite is present, but its crystallinity decreases steadily with increasing temperature and

can be used as a rough guide as to the firing temperatures. The feldspars and the carbonates are not greatly altered except for the carbonates which are burned but revert to carbonate again on weathering.

Conclusion and Recommendations

At this early stage in the investigation, two main generalizations can be made that seem to hold true in all cases.

1. The manufacturers of the pottery did not seek any special clays for their pottery, such as the kind that occurs directly under the coal seams in the area, but just used the soil in the immediate vicinity.

2. The range in firing temperatures seem to be nearly constant and never above 900°C. There are a number of cases in which the firing temperature of the particular specimen never exceeded 550°C as shown by the presence of kaolinite. This may be a result of the uneven firing of the vessel. It would be expected that the pottery placed in a fire, the base of the pot would reach a higher temperature than the neck or rim.

It is recommended that material from the Cahokia site be continued to be processed so that a complete picture of the character of pottery mineralogy be completed, and it is hoped that this can be directly linked to the mineralogy of the parent material.

It would be very helpful to obtain both soil samples and sherds from entirely different areas to see if there is any distinct difference either in mineralogy or firing temperatures.

The manufacture of pottery under conditions similar to those being tested with thermocouples included in the pot before firing so that the firing temperatures can accurately be determined. In this manner it may be possible to obtain an idea of the temperature gradient within the pot itself.

Investigations of the slips have proved to be of little use in determining if it was painted on or is the color of the burnt clay material.

Comments on "Conclusions and Recommendations" in Report by B. Carss, James Porter, Southern Illinois University Museum

Item 1. To the geologist using only X-ray methods, the alluvial clays are not special clays. It is advantageous to know the aboriginal potters did not use Pennsylvanian underclays, but now other methods, thin-sections for example, must be brought into the analyses to check on the characteristics of the potter's clay.

Item 2. An important fact here is that the low-fired specimens (under 550°C) are "stumpware." We do not know the function of this pottery but we do know it is always grog-tempered and usually with two or three pottery types being crushed and added as temper for a given piece of "stump."

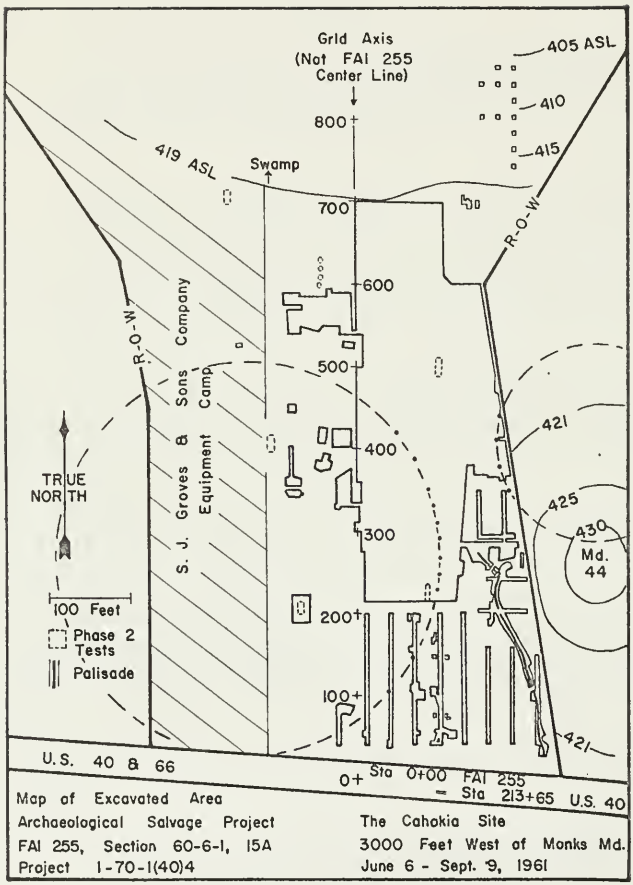

Grid Axis
(Not FAI 255
Center Line)
405 ASL
410
415
800
419 ASL
Swamp
700
R-O-W
600
R-O-W
S. J. Groves & Sons Company
Equipment Camp
500
421
400
TRUE
NORTH
425
430
Md.
44
300
100 Feet
Phase 2
Tests
Palisade
200
100
421
U.S. 40 & 66
0+
Sta 0+00 FAI 255
Sta 213+65 U.S. 40
Map of Excavated Area
Archaeological Salvage Project
FAI 255, Section 60-6-1, 15A
Project 1-70-1(40)4
The Cahokia Site
3000 Feet West of Monks Md.
June 6 - Sept. 9, 1961

FIGURE 3

IV

ILLINOIS STATE MUSEUM PROJECTS

October 1961 to June 1962

by

Warren L. Wittry and Joseph O. Vogel

Introduction

This paper outlines the results of the first year of analysis of the data and materials from the Cahokia site.

The basic field work was conducted during the summers of 1960 and 1961 under the direction of Wittry, then Curator of Anthropology, Illinois State Museum. This research was undertaken in co-operation with the Illinois Division of Highways and was financed by the United States Bureau of Public Roads. It is part of the Coordinated Archaeological Investigation of the American Bottoms, a project of the Illinois Archaeological Survey. Subsequent laboratory analysis was financed by the National Science Foundation under Grant NSF-G17922.

In May, 1962, Wittry resigned his position at the Illinois State Museum to become Assistant Director and Curator of Anthropology at Cranbrook Institute of Science, Bloomfield Hills, Michigan. In order to facilitate his continued participation in the American Bottoms Research Project, all of the field notes and maps of excavations were microfilmed and xerox prints were made from the films. He will receive a small portion of Grant NSF-G23998 for the purpose of engaging an illustrator to assist in his studies of architecture, settlement pattern and ceremonialism.

Basic Data

In brief summary, the data obtained from the field investigations consists of the following plus the pertinent notes, maps, photographs, and other records:

I. Summer of 1960. Tract 15B, 800 feet west of Monks Mound, and north of Highway 66.

A. The remains of 131 prehistoric houses.

B. 13 burials.

C. 465 storage/refuse pits.

D. The outline of 4 large circular structures.

E. A large rectangular compound of small circular structures connected by walls.

F. Over 100 cubic feet of artifacts, faunal refuse, botanical specimens, skeletal remains, soil and carbon samples.

II. Summer of 1961. Tract 15A, 3000 feet west of Monks Mound and north of Highway 66.

A. The remains of 176 prehistoric houses.

B. One burial.

C. 384 storage/refuse pits and post pits.

D. The outline of 4 large circular structures.

E. A palisade which may relate to Mound 44.

F. Over 150 cubic feet of artifacts, faunal refuse, botanical specimens, skeletal remains, soil and carbon samples.

In this report no mention is made of the non-ceramic artifacts obtained in the field investigations. These have been relatively scanty in number and to date little beyond cataloging has been done with them. Ultimately, these non-ceramic materials will be included in the analysis.

Analysis

Most of the first year has been taken up with the preliminary processing of the material obtained, e.g.--washing, sorting, cataloging and establishing the ceramics analysis program, for which a 5 x 8 inch single-row edge-punched card has been programmed by Wittry.

Tracts 15A and 15B were two of perhaps the three or four remaining good areas in the central Cahokia site. Preliminary testing on these tracts indicated they contained much desired information about ceramics, house types, settlement pattern and the temporal changes which had taken place in these. The excavations revealed that Cahokia, already heavily occupied in Late Woodland times, had made a shift to a Mississippian kind of culture with an astonishing development of ceremonial structures.

The present paper is not exhaustive: the problems of Mississippian ceramics are barely touched; the sequence of architectural types is drawn in the boldest of outlines; the ceremonial structures are merely described; the section on Woodland ceramics contains preliminary descriptions where additional analyses are underway.

The Late Woodland "Bluff Culture" Occupation

A result of considerable importance of the recent work is the revelation that the American Bottoms were heavily populated during Late Woodland times.

We have become accustomed to referring to this Late Woodland manifestation on the American Bottoms by the term "Bluff Culture." Through certain crossties in ceramics, we feel certain that many of the mounds of Titterington's Jersey Bluff focus and others on the edge of the bottoms area contained burials of people who lived on the Bottoms. The same vessel types are present, but the ones with the burials are smaller than the culinary vessels of the Bottoms.

The Late Woodland Occupation, which occurred during the approximate period of A.D. 500 to 800, is characterized by a particular pottery type and a house form markedly different from the latter Mississippian occupation.

"Bluff Culture" houses were usually constructed in a rectangular, steep-sided basin dug to a depth of 1.5 to 3.0 feet below the surface. The walls were formed of single poles, averaging 0.4 ft. in diameter, set into individual holes spaced at intervals of 0.5 to 1.0 ft. The earliest of these dwellings average 75 square feet (ca. 7 x 10 feet) and gradually increase in size to about 150 square feet (ca. 9 x 17 feet). Usually one-half of the house was taken up by a sleeping platform. There was no evidence of hearths associated with these structures.

We interpret that each house was occupied by a nuclear family and that there were no strong differentiations of individuals beyond those of age and sex.

There is an average of three to four storage pits, usually rectangular in outline, associated with these houses.

In every instance of intersection between "Bluff Culture" and Mississippian houses, the latter have proved to be superimposed upon the former.

Several houses appear to be transitional between the typical "Bluff Culture" dwelling and the typical Mississippian house, and there appear to be some pottery correspondences between the late "Bluff Culture" material and the Mississippian; i.e., persistence of limestone-tempered, red-slipped vessels, "stump ware," the use of shell temper in some of the late Bluff pottery and the existence of otherwise typical Bluff culture jars with smooth or smoothed-over-cordmarked bodies. Whether these represent stages in a gradual change from one form to the

other, or the mixing of techniques due to partially contemporaneous living by the two cultures, is a question we hope will be resolved later in the analysis.

Late Woodland Ceramics

We are presently conducting a very detailed analysis of Cahokia pottery with the use of punch cards. For the sake of the primary stages of this analysis, we have refrained from using the customary type nomenclature associated with materials from the Cahokia area. In this way, we hope to use to its maximum advantage the unique opportunity of having a large sample of materials excavated proveniences of known stratigraphic relationships.

Similarly, insofar as the evidence gathered to date tends to indicate the unsatisfactory nature of any system of ceramics classification for the American Bottoms which uses paste as a primary sorting characteristic, we have tried to make the initial sorting according to variations in vessel form, assuming that similar shapes would imply similar functions. Accordingly, the card sort system employed takes into account various physical characteristics attributable to ceramics, as well as form by placing a profile drawing of each rim sherd and another of the surface of each decorated sherd on the back of the card.

In this manner, we are able to rapidly compare large quantities of ceramic data according to provenience or specific characteristics. The following is a series of tentative Late Woodland ceramic categories arranged in rough chronological order:

I. Early "Bluff Culture"

Shapes: Predominantly the basic "Bluff" jar and the cord-marked globular jar and bowl. Use of grit tempering, with an early change to use of reground sherds (grog) as the tempering medium.

II. Middle "Bluff Culture"

Introduction of limestone tempering, sometimes in combination with grit and grog. Use of red-filmed surfaces and globular vessels with smoothed bodies, which begin to replace the cord-marked bowl.

III. Late "Bluff Culture"

Introduction of shell-tempered "Bluff," sometimes in combination with grog, shell, or grit tempering. The basic "Bluff" jar form becomes less restricted, rims are often flared, notching is quite frequent and strips or fillets are applied to the lip, which are often notched, as well. Bodies may be smoothed. Some punctation possibly occurs on the globular, smooth-surfaced jar.

At present, we are limiting ourselves solely to ceramics with house proveniences, in order to take advantage of known stratigraphy to limit and define a rough or working chronology of the ceramics at the site. This sample will be later expanded by the analysis of the material from other proveniences.

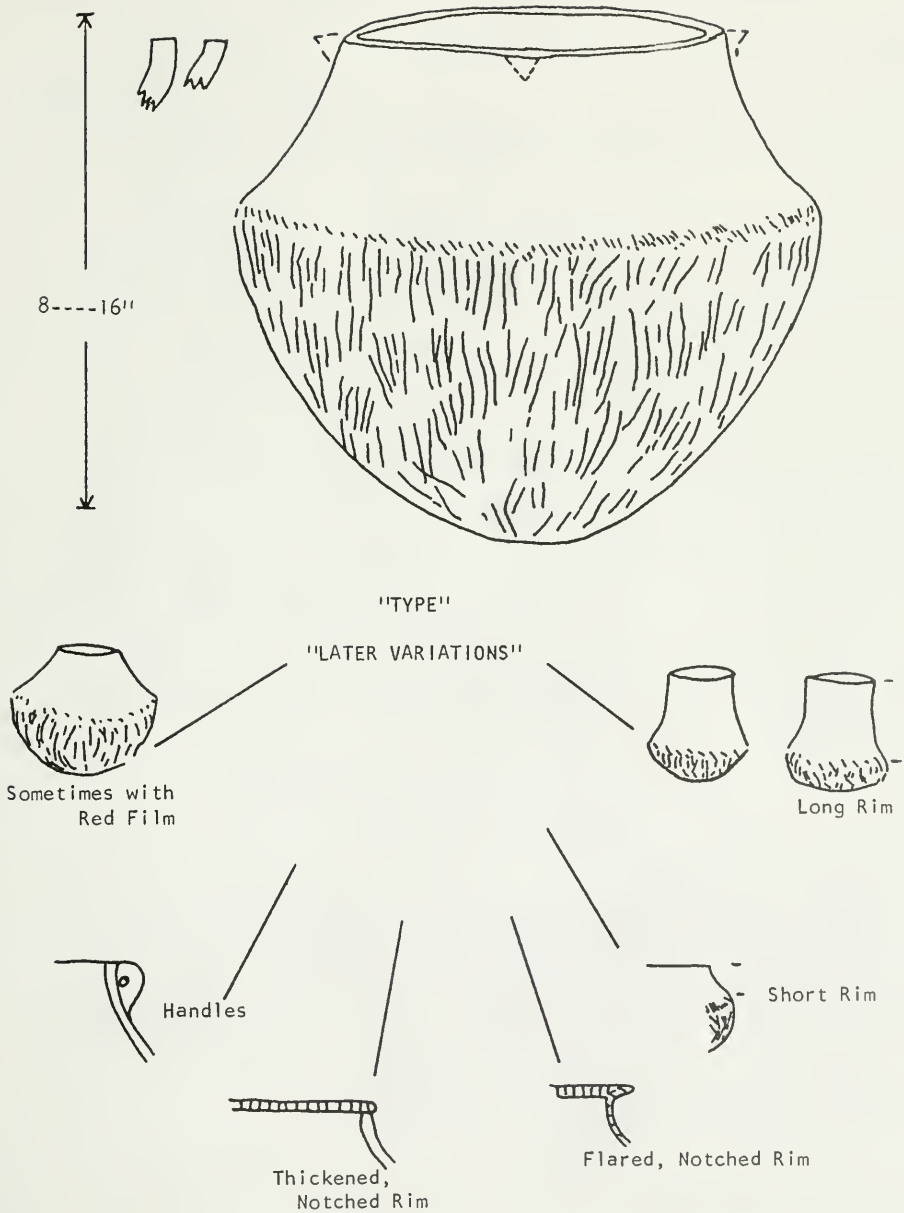
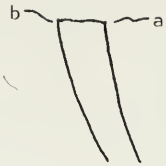

8----16"
"TYPE"
"LATER VARIATIONS"
Sometimes with
Red Film
Long Rim
Handles
Short Rim
Thickened,
Notched Rim
Flared, Notched Rim

FIGURE 4

FIG. 5

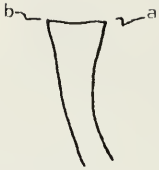
lattened; maintains
niform thickness;
nnotched; usually with
ip, lug, or handle;
ccasionally red slip.

FIG. 6



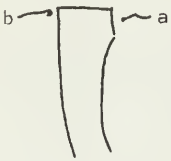
Flattened; gradual thickening; sharp angle or slight rounding at a & b.

FIG. 7



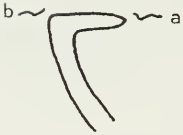
Flattened; thickened--sharp angle or slight rounding at a & b.

FIG. 8



lattened; flat
ertical surface
t a--sharp angle or
light rounding at b.

FIG. 9



Lip extended horizontally; a rounded; sharp angle or slight rounding at b.

FIG. 10

Flared Rim with rounded lip.

FIG. 5	Most common rim form of this series
FIGS. 6 thru 8	Occasionally notched, no handles or lugs
FIG. 10	Usually notched
FIGS. 9 & 10	Occasionally red-filmed
FIG. 8	Frequently fillet at lip

FIGURE 5-10

VARIATIONS ON THE BLUFF JAR RIM FORM

(inner surface to the left on all figures)

The present study is based solely on rim sherds, sorted so as to eliminate duplication of vessels. The sherd count given therefore may be regarded as representing as many vessels.

The Bluff Jar

VARIETY 1. 169 Sherds

Temper: Primarily sherd-grit, light or dark grit, occasionally with some added clinker.

Sherd	125
Limestone	19
Light Grit	14
Dark Grit	11

Paste: Color tends toward the lighter cream to orange series. (Eighty-seven per cent or 134 sherds) Thirty-one sherds showed a dark core.

Lip: Squared, occasionally with inward or outward bevel. Presence, direction, and degree related to pronouncedness of the curve of the rim.

Rim: See Figure 3. This rim varies in length from 18 mm. to 123 mm.

Body: Basal section usually globular or flattened globular, meeting the rim at pronounced shoulder.

Surface: Body - cord-marked; finish - coarse to medium. (One specimen from 15A not processed for inclusion in this study has proved to have a smoothed-over cord-marking body.)

Rim - smoothed or crudely smoothed.
Shoulder - often marked by a narrow band of diagonal cord-marking.
Interior - usually smooth or crudely smoothed.

This description corresponds to the central drawing of Figure 4 and should be considered as a description of this variety in general. The varieties 2-6, which follow, are variants with significantly different rim forms. Similarly, varying paste types occur within each of these variants. It is the body shape that must be viewed as a significant sorting characteristic and its persistence within a certain ceramic and architectural context as basic to defining this type.

Occasionally a red slip (17) is found on this variety.
Rim diameter - average 22.2 cm.; range to 32 cm.
Thickness - average 5.0 mm.; range 2 to 10 mm.

VARIETY 2. 17 Sherds

Temper and Paste: Consistent with form 1.

Temper -	sherd	14
	limestone	3

Lip: Flattened with thickening.

Rim: See Figure 6; occasionally notched (7 sherds).

Body: As in 1.

Rim: Diameter - average 16.1 cm. range 8 to 23 cm.; thickness - average 5.0 mm.; range 2 - 7 mm.

Appendages: None.

Surface: As in 1.

VARIETY 3. 10 Sherds

Temper and Paste: Consistent with form 1.

Temper -	sherd	8
	light grit	2

Lip: Flattened with thickening.

Rim: See Figure 7; occasionally notched (8 sherds).

Body: As in 1.

Rim: Diameter - 20.6 cm.; range 17 to 28 cm.

Average wall thickness = 3.5 mm; range 2 - 8 mm.

Appendages: None.

Surface: As in 1.

VARIETY 4. 12 Sherds

Temper and Paste: Consistent with form 1.

sherd	11
light grit	1

Lip: Flattened with thickening: often this thickening is accomplished through the use of a filleting strip applied at the lip.

Rim: See Figure 8; occasionally notched.

Body: As in 1. (One specimen from 15A not processed for inclusion in this survey has a smooth-surfaced body.)

Rim: Diameter = range 10 - 30 cm.; average 20.7 cm.

Appendages: None.

Surface: As in 1.

VARIETY 5. 5 Sherds

Temper and Paste: Generally consistent with form 1; with addition of one shell-tempered sherd.

Sherd	2
Light Grit	1
Dark Grit	1
Shell	1

Lip: See Figure 9.

Rim: See Figure 9.

Body: As in 1.

Rim: Diameter - 13.2 cm.; range 12 - 16 cm.
Thickness - 4.8 mm; range 4 - 5 mm.

Appendages: None.

Surface: Rims smoothed to highly smoothed; red slip (5).

VARIETY 6. 9 Sherds

Temper and Paste: Consistent with form 5.

Sherd	5
Shell	3
Dark Grit	1

Lip: Rounded, almost always notched (8).

Rim: See Figure 7; Diameter - 23.5 cm.; range 16 - 30 cm.
Thickness - average 4.1 mm., range 3 - 5 mm.

Appendages: None.

Surface: As in form 5; occasionally red slip (8).

CORD-MARKED BOWL 30 Sherds

Temper: Almost exclusively sherd-grit; of the sample of thirty rims, only four contained crushed limestone temper.

Paste: Color - tends toward the lighter series, cream to orange, with seventeen pieces being buff; there are three instances of the dark gray-black. A dark core occurs in nineteen cases with sixteen of these occurring in the buff-colored sherds.

The exterior surface is generally brown in color - the interior much the same with one instance of red slip having been applied to the interior surface.

Surface: The exterior is always covered with coarse to medium coarse cord marking. In fifteen instances, the cording continues up onto the lip. The interior surface smooth to crudely smooth.

Lip: Generally flattened across the top - four sherds show a slight rounding. Distinction between square or beveled lip is purely a function of the wall curvature (14 square lips, 12 beveled lips).

Rim: Of two types, incurving and simple curved.

Body: Shape - flattened globular to rounded conoidal. Two basic body types - the constricted-mouth jar; and the bowl, depending upon the curve of the rim.

The walls display a uniform curvature, with no sharp shoulder breaks.

Wall thickness - average 5.4 mm; range 4.9 to 6 mm.
Rim diameter - average 30 cm.; range 23 to 33 cm.

Synonomy - Korando?, Mulberry Creed Cord-Marked.

GLOBULAR JAR 49 Sherds

Temper: Predominantly crushed limestone, with lesser frequencies of sherd and shell with an occasional sherd showing either light or dark grit.

Limestone	24
Sherd	16
Shell	6
Dark Grit	2
Light Grit	1

Paste: Color - The paste tends toward the lighter series of cream through orange (90 per cent or 44 sherds), 25 of these have a dark purplish-black core.

Lip: Form varies; may be flattened (square or beveled) to rounded. Two sherds show a slight rolling or thickening out.

Rim: Either simple curve or inward curve.

Body: Two distinct forms relative to rim forms - Bowl and Constricted-mouth jar. The walls curve uniformly from lip to rounded base, with no shoulder break.

Surface: Exterior surface usually smoothed to highly smoothed. Frequently a red film is added (33). The interiors are usually smooth; many of the bowl shapes have highly smoothed interiors .

with a red slip. (See additional note at end concerning vessel with smoothed-over cord-marking body.)

Rim diameter - average 20.3 cm.; range 7 - 33 cm.
Wall thickness - average 5.3 mm.; range 2 - 10 mm.

Decoration: Occasionally a series of punctates just below the rim. (See below for discussion of punctation on this type.)

Appendages: Some sherds have holes either singly or paired just below the rim.

Synonomy: Monks Mound Red.

This type appears to be a Middle and Late "Bluff Culture" addition to the American Bottoms pottery complex and as such tends to displace the cord-marked globular vessels. Their use and the application of red surfaces to vessels apparently began before any Mississippian influences were present in the area (or before Mississippian influences began to develop at Cahokia). As a type, it continues into the Mississippian occupation, during which period the surface around the orifice and the area above the shoulder are often elaborately punctated.

This punctation may be either in the form of a single or double line of punctations concentric with the opening; broad vertical stripes, often unslipped, filled with punctations, or punctations placed within the area of a broadly trailed line. These lines may run either concentric to the orifice or as a series of connected arches. Occasionally, the punctations will be found associated with a raised or depressed area of the surface, a thin raised ridge, or an inverted triangular area. It is common for the surface between the line of punctations and the lip to be at a somewhat lower level than that of the rest of the vessel.

This elaborate punctation has been observed only upon constricted mouth jars, generally bearing a film.

Only two of the present examples of punctation are from a "Bluff Culture" provenience (House 75). The first of these is shell-tempered with a red slip. The punctations vary in diameter from 1.5 to 3.0 mm. One series fills a broadly trailed line, whereas the second, probably a series of connected arches, is slightly higher on the rim than the first and lacks the broad-trailing. The second vessel from this house is unique in some other respects. It is sherd-tempered with a quite conventionally shaped body. The upper rim is quite smooth, whereas the body has been smoothed-over cord-marking, with the cord impressions quite deep and distant in many places. The manner of punctation is distinct from that of all the other examples. In contrast to other vessels which usually have a neat arrangement of indentations 2.0 to 2.5 mm. in average diameter, round and flat-bottomed, the decoration of this vessel is somewhat crude. The punctations are small (1 mm. in diameter), irregularly spaced in two concentric lines the distance between which varies from 1.2 to 2.3 cm. The punctations, themselves, seem to have been produced by a pointed instrument, such as an awl, and applied in a manner which sometimes produced a round outline and at other times quite elongated ones.

There is at least one effigy fragment from a late "Bluff Culture" context. This is a rather small sherd-tempered, modelled bird's head from a house floor.

In many of the storage/refuse pits of tract 15A, where quantities of the red-filmed and elaborately punctated pottery occur, it is found to be in both shell and limestone-tempered forms within the same pit.

Whereas, internal evidence indicates that this type early in its history was a distinct "Bluff Culture" type, the "Bluff Culture" examples mentioned and the evidence of all other pottery of "Bluff Culture" provenience indicate that punctation was not a standard decorative device of the "Bluff Culture" peoples on the American Bottoms. The red-filmed, smooth-surfaced ware of the "Bluff Culture" period is identical with that of the Early Mississippian Occupation with the addition of the punctation, raised, depressed and modelled areas. Finally, the shell-tempered form superseded the limestone-tempered one.

As the analysis continues and more data from the tract 15A is studied, it may be possible to demonstrate the reality of the continuity between "Bluff" and Early Mississippian Occupations suggested by the materials already examined.

The Mississippian Occupation

During the first year of analysis, the bulk of our work has been with material from tract 15B. Due to the limited and specialized nature of the occupation of this portion of the site during the Early Mississippian period, this tract exhibits a profound dichotomy of "Bluff Culture" and Late Mississippian ceramic and house remains. The large compound fills the temporal gap. Ceramics which might conveniently be called Early Mississippian comprise less than two per cent of the ceramics analyzed from this tract. As intimated in the section on Late Woodland ceramics, the 15A tract appears in general survey to contain not only a higher percentage of Early Mississippian materials, but in addition others which appear to indicate transition or at least contact between "Bluff Culture" and Early Mississippian peoples.

Certainly, the beginning of the Mississippian period saw the introduction of profound changes into the social and communal structure of the peoples living on the American Bottoms. It may be possible, ultimately, to determine something about the size of the family by a statistical comparison of the size (i.e., cooking vessels) of "Bluff" and Mississippian vessels. Although such differences in size may also reflect different eating habits, correlation with differences in house size and other factors may prove useful in such analysis.

The large open-mouthed jars found on Mississippian house floors were used for cooking rather than storage. They show oxidized bottoms and, from the neck to the lip, reduced surfaces. Most likely this is a result of having been heated while being suspended above the fire. Sherds from the bottom, side and lip of these vessels show no differences

as to firing temperatures, indicating that the heating which occurred after the initial firings did not reach the temperature of the original firing.

The Mississippian Houses

Significantly, even the smallest houses of the Mississippian Culture were larger than the largest of the "Bluff Culture" houses. Mississippian houses exhibit a variety of forms and sizes. The most common type was rectangular, constructed of thicker poles set in wall trenches. Though the plans were generally rectangular, a number of houses had floor plans in the shape of the letter " ," and in one case, two structures were connected by a "breezeway," or short covered connecting passage. These structures tend to be oriented along a north to south or north-northeast to south-southwest axis. Sizes range from 13 by 15 feet to 25 by 40 feet. Larger Mississippian houses, ranging in size up to 40 by 60 feet are interpreted as public buildings or "council" houses rather than dwellings. These tended to be located near the edge of the swamp. Some of the houses were semi-subterranean. There was rare evidence of hearths within these rectangular structures.

An interesting group of structures encountered on the 15A tract were a series of circular wall trench houses, which were also located near the edge of the swamp. These houses are generally quite small, being between 9.5 and 16 feet in diameter. They are the only ones encountered in which there was regular evidence of hearths. These were always a circular straight-walled pit about 1 foot in depth (Fea. 94 associated with House 41--1.5 feet in diameter, 1.25 feet in depth), located in the center of the structure.

At least one of these structures, House 41, was semi-subterranean. Its wall trenches had been dug into the floor of a circular straight-walled basin 1.7 feet beneath the surface. This house had been superimposed upon by at least one other rectangular, wall-trenched structure. Another of these structures, presumably built upon the surface, had its entrance marked by two short wall trenches radial to the outside of the wall line. This house was superimposed by a large post-pit. There is evidence indicating that these structures were constructed early in the Mississippian occupation and probably were limited to this time period. In one instance, one of these structures appeared instrusive upon a rectangular wall-trench structure. The difference in shape and the presence of hearths in these structures are suggestive of some difference in function between these houses and the regular Mississippian structures. Assuming an annual cycle of intermittent occupation of the site and the apparent contemporaneity of these structures of the site, it may be further suggested that these structures possessed some special function, i.e., sweat houses, or were used to house individuals of special status who remained at the site throughout the year.

The excavations of 1960 while uncovering the compound made it evident that this area adjacent to Monks Mound was largely unoccupied during the early period of Mississippian occupation. We infer this to be a result of the presence of the compound and the cult nature of the area during that period. In later Mississippian times, this area again

reverts to a residential area, with new structures appearing superimposed upon the remains of the compound.

The Compound

The most intriguing discovery of the 1960 investigations was a compound. A superficial examination of the contents of some of the features which it intersects and which intersect it indicates that it was constructed in Early Mississippi times. In total plan, it was probably square or rectangular with most of it lying outside the highway right-of-way to the west. The salvage excavations revealed the east wall and portions of the north and south walls. Spaced at regular intervals of approximately 18 feet were small circular structures 10 feet in diameter. All of them had doors or openings facing to the inside of the compound. These circular structures were connected by walls which were built in the same manner as the small circular structures: A trench was dug and posts averaging 0.4 foot in diameter were set at intervals of one foot on center or less. The fill of the post-molds indicated that the walls had been covered with orange-colored clay. The north-south dimension of the compound was 180 feet. The distance from the east wall westward to the edge of the right-of-way was about 60 feet.

That it is located within a "plaza" area strongly indicates that it may have been square, in which case the corners would be equidistant from the mounds at three of the corners of the plaza. The deciding factor in the placement of the Mound 76 (northwest corner of plaza) most likely was the proximity of the swamp, which prevented the erection of the mound at a location in symmetric harmony with the remainder of the area.

A wall trench on the very edge of right-of-way inside the compound contained postmolds filled with orange-colored clay identical to that in the wall of the compound and may indicate the presence of a central building associated with the compound. It may be possible, when the field evidence is examined in detail and a study of the literature is made, that a more definite statement about the function of the compound can be made.

The Palisade

In the long test trenches excavated at the southern end of the tract 15A, near Highway 40 and 66, a long winding trench was encountered. In all probability, this trench represents the location of a palisade of upright posts. This is the first discovery of a palisade at Cahokia. There were no post-molds evident in the trench, indicating that the palisade had been deliberately razed and did not rot in position. It is doubted that the palisade was constructed for defensive purposes. Instead, its relationship to Mound 44 which lay immediately to the east, outside of right-of-way, indicated that it may have served as a means of setting off the area of the mound from other parts of the town.

The soil of the mound is sandy. The fact that the soil filling the trench is sandy, in contrast to the gumbo of the area, is a further indication that the mound and palisade were related. It is presumed that when the palisade was taken down, soil which had washed down from the mound filled the trench. The palisade was traced to the south as far as the drainage ditch along Highways 40 and 66. There is a possibility that it may be picked up on the south side of the highway if salvage work is conducted in that area. To the north, the palisade was traced to the point indicated on the map, where it may have ended.

Large Circles of Posts

Over fifty "bathtub-shaped" pits were found on tract 15A. These long, narrow pits have floors which slant down from one end to the other. Several of these had been excavated on tract 15B during the 1960 investigations. At that time, their function was in question, but it was suspected that some had been dug to obtain underlying clays and that some served as a means of erecting large posts. A preliminary study of the artifacts contained in the fill of these features and their stratigraphic relationship to certain house types leads to the conclusion that these large post pits were dug mainly in a limited time period, very Early Mississippian. While there are some indications that some of these posts stood individually and may have served as ceremonial or game posts, it was determined that others were in alignments that represent segments of perfect circles. The post pits were interspersed in the area excavated together with 176 houses and over 300 other pit features. It was only when a separate tracing of the locations of post pits was made, and some efforts to determine relationships by geometry were tried, that the circular patterns became apparent.

The posts involved have diameters of about two feet. They were set into the ground at depths of between 3½ to 4½ feet below the surface. Additional soil may have been mounded about the bases to add stability, but this is conjectural. With such diameters, it is possible that these posts were quite high.

One of the circles, whose center is located outside the highway right-of-way, was 240 feet in diameter and apparently had 24 posts spaced 31.0 feet from center to center around its perimeter. Since the area of Mound 44 overlaps the area of the projected circle, it is possible that this circle was an earlier feature than the mound. Another circle 480 feet in diameter, whose center was covered by the equipment camp of the construction contractor, apparently had 72 posts spaced at intervals of 21.0 feet around its perimeter. In both circles, the downward slant of the pits was toward the center of the circle. Although only segments of these circles were excavated, the writers have no qualms whatsoever in projecting their total plans or in calculating the number of posts involved, as given above. The fact that three smaller circles were completely within the area excavated in 1960 lends support to the present interpretation. The first, in terms of stratigraphy, appeared as a segment of a circle 50 feet in diameter. Subsequently, three larger circular structures, 80 feet in diameter, were constructed in succession on approximately the same location. One of these had similar single posts spaced between 13.0 and 14.0 feet on-center. The

post pits were also of the "bathtub" variety. The other two circles were also 80 feet in diameter but the posts were more closely spaced and were placed in trenches. It seems likely because of the great size and apparent lack of interior support posts that these structures may not have possessed roofs.

In the small circles of Tract 15A nothing by way of a structure or feature was found inside which could be linked with them.

The function of these circles is in question at the present time. Their presence at this large center of prehistoric population of an Early Mississippian time-level gives, at least, an indication of some forms of major ceremonial activity.

Burials

Among the results of the 1960 investigations were the discovery of thirteen burials. This total included both those in flexed and extended positions. Associations were present with three extended burials. A pottery vessel was found with Burial 1, two vessels (duck head effigy bowl and wide-mouthed water bottle) with Burial 8, and a galena bead with one of the two individuals of Burial 13. The general excavations produced scattered human remains. Teeth and bones were found in wall trenches, pits, and refuse areas. These discoveries are not necessarily evidence of cannibalism as is the case with the closely related site of Aztalan, but perhaps indicate careless disposal of the remains of the dead or disturbance of earlier burials by later Indians.

During the summer of 1961, discoveries of human skeletal remains were confined to one pit which contained bones of three legs and one arm, representing four different individuals.

In almost all cases, these were extremely fragmentary and so poorly preserved as to discourage any further study. In all cases, some type of pit, generally shallow, was dug to receive the remains. Those, that can be either by means of artifact association or position relative to some structure attributed to one of the occupations of the site, are all Mississippian.

Pottery vessels placed with Late Mississippian burials usually consist of water bottles and small jars or bowls. The concept of interring food and drink for the deceased allows an interpretation of similar function for similar forms found in the village debris.

V

SOUTHERN ILLINOIS UNIVERSITY PROJECTS

by

James Porter

Introduction

In reporting the work done during the period July 1, 1961 - June 30, 1962, we will follow, in the same order, the projects outlined in the NSF grant proposal: "A Coordinated Archaeological Investigation of the American Bottoms," submitted by the Illinois Archaeological Survey, January 25, 1961. The research projects for Southern Illinois University were listed on pages 7-8.

Summary of Fieldwork

During the summer of 1961, Southern Illinois University Museum returned to the Mitchell Site (20B2-3) to carry out highway salvage excavations of the "town plaza" and two additional temple mounds. The work was supervised by J. W. Porter under the direction of M. L. Fowler.

All artifactual material recovered during the summers of 1960 and 1961 at the Mitchell Site was washed and numbered by the end of December, 1961. This tedious work was speedily accomplished through the cooperation of Warden Ross Randolph of Menard State Penitentiary, Chester, Illinois. Warden Randolph permitted the use of a classroom and a small crew of enthusiastic prison "guests" who learned the system fast. An increase in the number of small polished hoe fragments, for example, was directly due to the alert detection of the fragments by the inmates who were marking every item excavated at the site.

All field notes for both seasons were indexed by Mr. Alan Harn who, as a field supervisor for SIU at the Mitchell Site during 1960 and 1961, was familiar with all phases of the projects. A large wall map was prepared for both seasons' work which gives a plan view of the areas excavated and the structures found. With this map, we were impressed with the areas that remained untested. In digging a single component Mississippian town we have found that buildings were scattered over a wide area and difficult to locate when digging in tacky alluvial clays. Due to the size of the site and the pressure of modern highway construction, we were unable to develop an ideal trenching pattern designed to adequately test all of the area.

A total of 60 structures were mapped. This includes small and large rectangular wall trench structures, post hole structures, and four circular wall trench structures. Ten pits were found and in only five

were artifacts found. We believe that the other five shallow, bowl-shaped depressions listed as pits were actually salt-pan molds. Fifteen post pits were excavated. The function of these pits (formerly called "bathtubs" in the Cahokia region) was finally determined through the efforts of Warren L. Wittry, his data, the data from the Mitchell Site, and the fortunate find at Mitchell of the butt of a large bald cypress log still in place in the bottom of the largest post pit excavated in the Cahokia area.

The alignment of buildings and wall trenches is being studied. From a large map of the site, it is apparent that buildings were widespread and generally all oriented in the same direction. The orientation relationship of these buildings to the mounds remains to be investigated. Evidence from under one small mound indicates that three large rectangular wall trench buildings were built one after the other during a very short period of time (possibly each year). The manner in which post pits were dug and their functions as center posts for these larger buildings was also determined. Some evidence pertaining to these buildings was lost due to an irregular trench cut into the south side of the mound by W. K. Moorehead in 1923 in search of an altar. We could not find the altar either and thus settled for mapping wall trench structures and salvaging the contents of pits.

During excavation of one of the larger mounds, we attempted to determine the size of an average basket load. Eight such loads were carefully worked out of the fill by tracing the slight differences that existed between the soil of a load and the loads surrounding it. Attempts to obtain a better sample met with failure due to a shortage of time.

The large bald cypress log measured 3.5' in diameter, was 10' long, and weighed approximately 4,000 pounds. The post pit in which it was found had been dug to a maximum depth of 16 feet where the butt was found to rest. When upright, the log was only 1-1½ feet short of the surface. Since this is the area where logs placed in soil normally rot off, we believe that it was placed upright and probably rose several feet above the ground. The pit had been dug in an area generally centering in the plaza-like space formed by the mounds. Very detailed mapping of this area between the mound (prior to finding the large post) revealed a slight depression remaining. It was noted by local informants that the area had always been wet when compared to the miles of flat alluvial ground adjacent.

Also visible on the ground was a very faint ditch dug earlier by a farmer to aid in draining this area.

In plan view, we find a striking parallel to an old sketch by Bartram of a Creel Ceremonial or Bush ground with a chunky pole in the center. The plan view appears in an article by A. R. Kelly in Early Georgia (1950, Volume I, No. 2).

The presence of a bald cypress log this far north, and especially of this size, indicates some change in types of vegetation during the past 1000 years. This supports the work of Schoenwetter who has been working with pollen samples from the area. At present, bald cypress grows no further north than extreme southern Illinois.

During excavations auger holes were found scattered over the site providing additional evidence of Moorehead's investigations. The mounds were apparently given special treatment as, in places, they were riddled with holes. Most holes were traced to base clay and properly recorded. From this work two things are apparent: (1) auger holes do not go straight down as implied by the drawings of mound reconstructions offered by Moorehead in "The Cahokia Mounds" (1929) and (2) that from auger holes one cannot be certain what he is cutting through if he is not familiar with the soils or the types of information that are present. Many of Moorehead's auger holes went down through post pits. In the bottom of one hole was found a catsup bottle containing a scrap of paper. The scrap, torn from the top of letterhead stationery, indicated a University of Illinois project for testing in the Cahokia region in 1923. Written in pencil on the paper was the name W. K. Moorehead (signature) and the date "March, 1923." Other traces of his digging have been mentioned.

Some testing was possible along and in a portion of the north shore of Long Lake along which the site is located. Long Lake is a very narrow body of water and obviously part of a very old river channel. The cultural debris dredged from this channel was found to be mixed with modern debris in the upper black mucks. This evidence indicates that it was cut off as a channel before occupation of the site and that little filling has taken place since. Such an interpretation had not been expected.

Approximately 10,000 sherds will be used for a ceramic analysis. Not only are the standard Cahokia types well represented, but foreign pottery (stylistically) is scattered throughout the site. Studies, using thin sections and the petrographic microscope, indicate that some of the pottery was made from clay not available in the immediate vicinity. In addition to the common shell-tempered pottery, we find local "bluff" pottery which, although often listed as grit-tempered, is found to be grog-tempered. This type of tempering is a common type found down the Mississippi River. In most reports it is listed as clay-grit or clay-sherd tempering. Thin section analysis has forced us to look more closely at this temper category in order not to miss the implications of knowing what was intended by the potter and not by what the archaeologist thinks he sees.

While working on the Mitchell Site, we were forced to attempt the salvage of archaeological material found along the south shore of Long Lake directly across from the site. This is referred to as the Fill Site (20B2-5). The contractor obtained his fill for the bridge cone and ramps of the now completed clover-leaf from a 60-acre south of Long Lake. Preservation of pottery, bone and vegetable matter was excellent as compared to that at the Mitchell Site north of the lake. Unfortunately, we found it difficult to supervise the main excavation north of the lake with 30-40 men and with no money or time to also properly excavate the area south. Along the top of the natural levee making up the south shore was found abundant evidence of pits and houses. No complete houses were excavated. A few burial and many refuse pits were salvaged.

C-14 Age Estimates

In December, 1961, 10 charcoal samples were submitted to the Michigan-Memorial Phoenix Project Radiocarbon Laboratory at the University of Michigan. The results on eight of the samples are: (All dates read "plus or minus 150 years.")

Mitchell Site

M1298:	785	(1177AD)
M1299:	875	(1087AD)
M1300:	Processing	
M1302:	750	(1212AD)
M1303:	950	(1012AD)
M1304:	785	(1177AD)
M1305:	1000	(962AD) + 120-150 yrs (annual rings)
M1306:	395	(1567AD)

Fill Site (across Long Lake - part of Mitchell Site)

M1301:	910	(1052AD)
M1307:	Processing	

Since analysis of the cultural material is still far from complete, we can only comment upon these age estimates in view of field evidence. The dates cluster around the period 1000-1200 AD which was as expected. The samples were chosen to represent a variety of structures found over a large site. M1298 was part of a charred roof support excavated from the top of Mound B. M1304, from feature 28, was from a set of superimposed houses on what is suspected was the north periphery of the site. The agreement in dates supports the field evidence of near contemporaneity of the samples. The date for M1305 was of interest since the sample was taken from the middle rings of the large 300-year bald cypress log found in the town plaza. We believe that the log was placed during the major occupation of the site. By adding approximately 120-150 years to the date to represent the bark area when the tree was cut, we get a date in the 1100 AD area. This generally agrees with the other samples. The only sample which is considered to be too late is M1306. The sample consisted of charred corn kernels found scattered through the silty fill of a refuse pit in Mound H. Because this mound, like the others, is made of black tacky alluvial clays, the pit acted as a reservoir of surface water. The plow zone cut across the pit opening. We believe that recent carbon contaminated the sample. Other field evidence for the samples indicates that the dates are good estimates of age but not data to be taken as exact dates.

Site Survey

Mr. Alan Harn was employed by SIU to carry on a site survey of the American Bottoms in the late summer of 1961 and the spring of 1962. The size of the American Bottoms, numbers of cities and housing developments, and the kinds of crops grown were problems in a survey aimed at locating sites before they are destroyed. The American Bottoms is rapidly becoming one solid metropolitan area from the Mississippi River to the bluffs on the east. Mr. Harn, working alone, could not cover as much ground as we had anticipated.

By June 30, 1962, Mr. Harn had located 47 archaeological sites. This does not include additional areas found in the Monks Mound vicinity or the Pulcher Site near Dupo, Illinois. Surface evidence indicates the following time periods to be represented at the indicated number of sites:

Archaic	-	28
Early Wood.	-	2
Middle Wood.	-	8
Late Wood. and Mississippian	-	23

A majority of the Archaic sites are spread along Cahokia Creek which cuts into the Wood River terrace of Pleistocene age. Sites of later periods are found along old creeks and sloughs. Minor testing of some of these sites is anticipated. In addition, this information is being made available to the archaeological highway salvage program in Illinois. It is hoped that this will provide additional time necessary to salvage information in the path of new highways in that area and avoid some of the pressure of modern highway construction on the archaeologists.

Site Testing and Salvage

The third project involved testing in the Mitchell area to determine the limits of the site. The plan to wait until weather and time were ideal was suddenly changed early in May, 1962. It was learned that what remained of the heart of the Mitchell Site (south of the highway right-of-way and on the north shore of Long Lake) was going to be used as a borrow pit by the contractor preparing to complete filling operations on new FAI 270 passing through the Mitchell area. Through an oversight on the part of those planning the highway salvage program, we had no way of carrying out emergency salvage under the salvage program as long as the borrow pit is owned by the contractor. The area involved four temple mounds in approximately 25-30 acres along the north shore of Long Lake. Since the contractor purchased an additional 60-80 acres south of Long Lake, we were forced to salvage what we could from that area as well, thus finishing what remained of the Fill site. A lack of funds, conflict with the local unions, and the lack of archaeologists made the salvage of information almost impossible. Those archaeologists available in the State of Illinois who joined us to try salvaging the data were Charles Bareis and Curtis Tunnell of the University of Illinois and Eugene Fugle and James Porter of Southern Illinois University. Four men against one million dollars worth of heavy earth-moving equipment is an absurd situation for good archaeological recording.

Much information was lost and the records obtained under pressure do not indicate the extent of cultural data that was destroyed. Hoeffken Bros. Construction Company of Belleville, Illinois, cooperated only as far as they had to in compliance with the local district office of the State Highway Department, State of Illinois. We obtained detailed maps of prehistoric buildings from under only one mound. Observations of the other mounds as large earth-moving equipment removed them indicated that there were buildings and artifacts under and on two of the mounds. The largest mound remaining since 1879 was one of those destroyed. At

the present time, only one average-sized mound remains of the eleven originally in the group. It and the 16 acres on which it stands is all that is left of this large site, and it is now obvious that this too will soon be swallowed by local expansion.

Information from under the one small mound could have been useful in analyzing the ideas developed during the better-planned salvage carried out in the summer of 1961. It had been hoped that this area would have been preserved as a park so that the time needed to explore and test hypotheses would have been available.

One thing concerning aboriginal architecture is apparent. We will have to understand the function of the structures and their relationships to each other before studies of changes in building habits through time can be definitive. Evidence from Mitchell indicates at least four or five building types to be in existence at one time. It is hoped that detailed study of the information from Mitchell will aid in determining the function of these structures. The destruction of the site in so short a period of time forced some changes in plans of the lithic laboratory. It was necessary to take abundant soil samples (clay and others) from over this large area to insure having enough to carry out research suggested by Project 6.

Fortunately, a detailed contour map covering the whole area had been prepared during the summer of 1961. Had we been forced to add this to our problems, we would have had time for little else. The site was completely destroyed in approximately six or seven weeks.

Lithic Laboratory

The fifth project involved: (a) setting up a lithic laboratory and (b) identifying the lithic materials from the excavations of the three participating institutions.

Although we have had some difficulty in obtaining equipment with any speed, all ordered in 1961 has arrived and has been tested to develop the methods we intend to use in identifying lithic materials. The basic tools used thus far are the binocular and petrographic microscopes. Materials need little special preparation for use under the binocular microscope and, where simple magnification solves identifications, this tool has helped. The petrographic microscope requires that in most cases the material must be specially prepared before the advantages of the petrographic microscope can be used. In preparing pottery for study, we have used the standard thin-section as it is made and used by geologists. The preparation of thin-sections is a tedious process where lithic materials are cut to mount on a slide and then through a series of steps ground with grinding compound to an approximate thickness of .03 mm. Many minerals at this thickness transmit light and by studying optical properties, identifications are much more precise. The relationship between items is preserved by using thin-sections. Crushing and viewing the fragment in some liquid of known refractive index is also useful, but by crushing, the original physical relationships are usually lost.

The study of lithic materials from the American Bottoms (other than pottery) has been limited to sampling a few chert types and, in two cases, where the question of positive identification was important. One case involved the suspected presence of Hixton Silicified Sandstone in the Cahokia region. The material was obtained from a quarry site in Wisconsin. It is found to be plentiful in late sites in that state (such as Aztalan). Thin-sections supported the megascopic identification of Hixton SS in the area.

The other instance involves the problem of identifying and separating clinker that floats down the Missouri River from its Plains source from bloated clay products that were produced by the Mississippian people living in the American Bottoms. Identification can now be made in most cases by using thin-sections. Neither material is "pumice" or "scoria" as recorded in the archaeological literature.

Most of the thin-sections have dealt with pottery from the American Bottoms and the adjacent region. Many of the thin-sections from other regions were paid for by the individuals who submitted them. Fortunately, the lithic laboratory has been allowed to retain all thin-sections for further study. This has helped to build our thin-section collection for pottery from the Midwest. At the present time, we have developed a simplified punch-card system for recording the microscopic feature of the pottery as seen in thin-section.

From thin-section analysis of pottery occurring in the American Bottoms, we have found a number of interesting features. Some of this work served as the basis for a paper read May 4, 1962, in St. Louis at the meetings of the Central States Anthropological Society. Grog tempering (crushed sherd) is much more common in the late Woodland pottery found in the Cahokia region than had been noted in the literature. Besides identifying grog tempering as a sherd, we have also been able to identify the temper used in the grog.

Soil Studies

The sixth project involving detailed soil studies has been hampered somewhat by the lack of equipment. The samples used in pollen studies by Schoenwetter were drawn from the large number taken in 1960 and 1961 by participating institutions. Attention has been given mainly to accumulating key samples of the black alluvial clays common in the American Bottoms. With a rapidly expanding urban center, we find many areas being destroyed. Much effort has been devoted to collecting a sufficient quantity of clays from the areas adjacent to the sites. These samples will be needed for a number of purposes including the manufacture of test tiles. These test tiles will be fired under controlled conditions in electric muffle furnaces and the tiles then thin-sectioned for comparison to the aboriginal pottery.

Soil studies completed thus far have been oriented toward grain size analysis and the mineralogic composition of certain grain sizes. The grain size analysis for samples has been aimed at gathering data on river deposits associated with the archaeological sites. In attempting to establish the location of the Mississippi River and numerous streams

and oxbow lakes at the times of Indian occupation has met with numerous problems. One interesting feature of the American Bottoms is the slow changes brought about by the Mississippi River over a 1000-year period. If our C-14 age estimates are correct for Mitchell and the Monks Mound area, we find it puzzling that so few and slow changes have taken place in the alluvial deposits. There will be a marked contrast between the American Bottoms alluvial history and the Lower Mississippi River Valley as studied and reported by H. N. Fisk in 1948.

In addition to the projects mentioned, one master's thesis pertaining to the American Bottoms was completed in July, 1962. Roberta Jean Griffith, working on a degree in the Art Department, Southern Illinois University, explored the details of construction and design elements constituting the pottery type locally called Ramey Incised. The majority of the sherds used by Miss Griffith came from the Mitchell Site. In addition to these, she also checked collections from the American Bottoms stored at the University of Illinois and the Illinois State Museum, Springfield, Illinois. The writer provided her with factual data pertaining to the sites as well as thin-sections of 24 of her sherds (Griffith, 1962).

VI

A LATE POST-GLACIAL POLLEN CHRONOLOGY FROM THE CENTRAL MISSISSIPPI VALLEY*

by

James Schoenwetter
The Museum, Southern Illinois University

The area from which the pollen samples were collected is known as the American Bottoms: the region which extends roughly from the mouth of the Illinois River to the mouth of the Kaskaskia River and centers about the junction of the Mississippi and Missouri above St. Louis, Missouri. The region is of particular interest in North American prehistory because it is there that the largest concentration of sites of the Mississippian culture is to be found. Mississippian culture is characterized by an agricultural economy, particular styles of pottery and other artifacts, and a social system sufficiently well-organized to plan and execute the construction of large earthen mounds. Monks Mound, only a few hundred meters from the locale of one of the pollen profiles, is the largest structure built in North America north of Mexico before the advent of earth-moving machinery. Associated with it were more than 80 other mounds and village deposits which cover many tens of acres.

Three sedimentary profiles (Figure 11) were collected from the banks of a slough which meanders next to the Cahokia village site near Monks Mound. The first profile contains two pollen zones. Zone I, extending only to a depth of 6 inches, is characterized by percentages of pollen of Chenopodiaceae and Amaranthus over 30 per cent, and by wind pollinated Compositae also over 30 per cent. Below this level Pollen Zone II is encountered, in which only anemogamous Compositae pollen is in excess of 30 per cent. The unusually low frequency of arboreal pollen is characteristic of all the sediment samples collected from the American Bottoms. The combined percentage of arboreal and unknown types is less than 25 per cent in 80 per cent in the samples so far analyzed. This contrasts strongly with pollen spectra from bogs in the northeastern United States and was completely unexpected. The pollen spectra from the American Bottoms may not be most favorably compared with those from alluvium in the southwestern United States and that recently reported by Sears from the Grassland Province.

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*Paper presented at the International Congress of Palynologists, Tucson, Arizona, 1962.

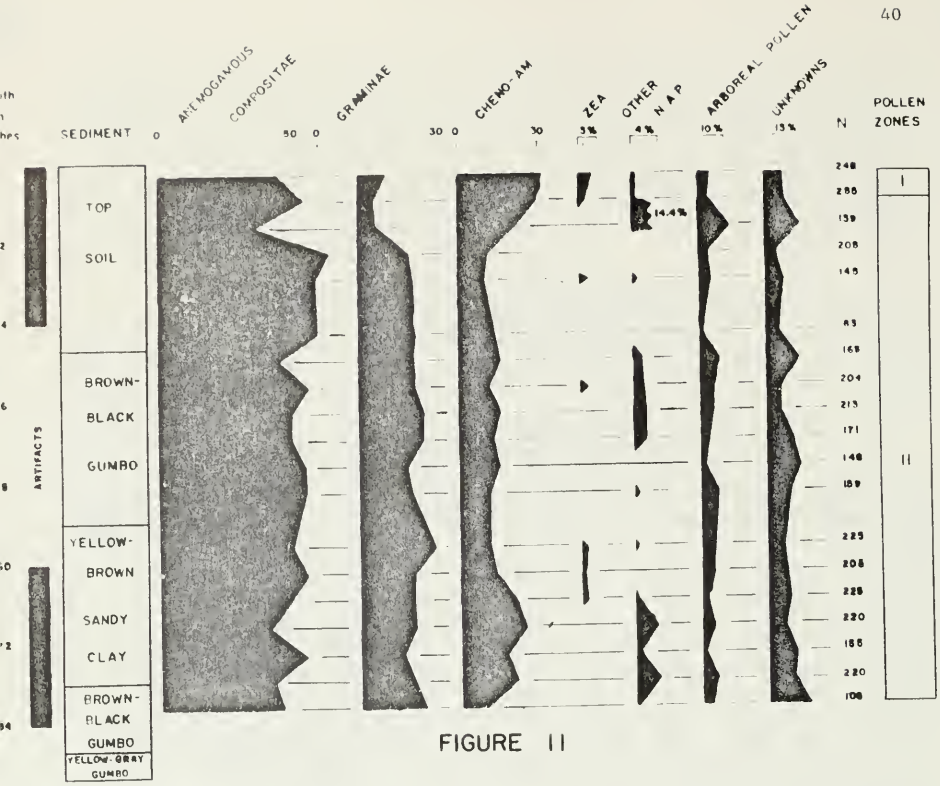

FIGURE 11

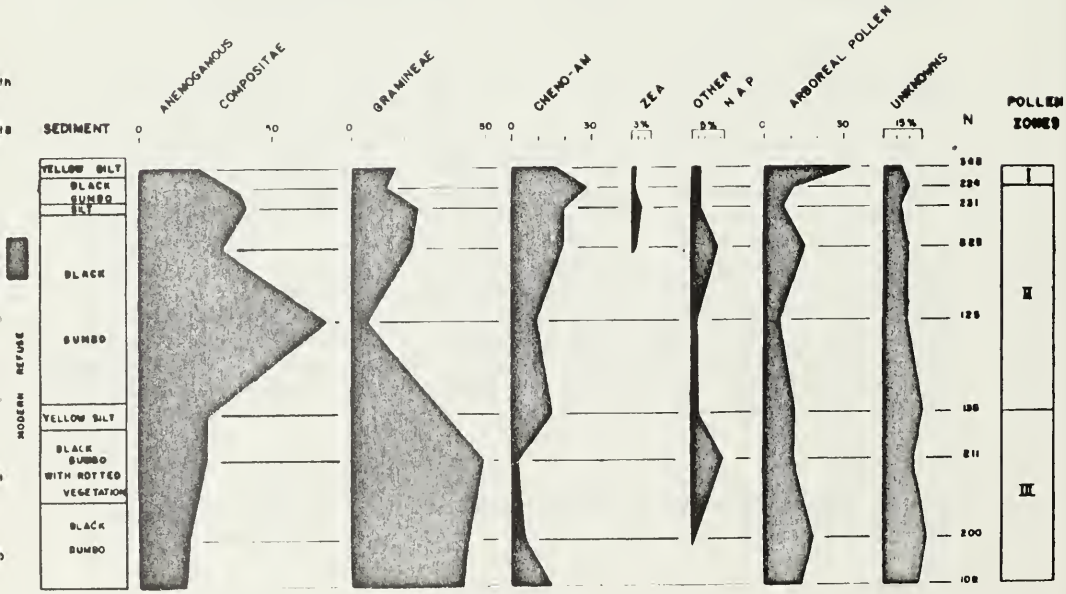

FIGURE 12

Before passing on to the next profile, I wish to point out that artifacts of Mississippian culture--in this case Old Village pottery types--were discovered in direct association in both pollen zones. Since Pollen Zone I is so shallow, however, it is likely that the recovery of prehistoric pottery from this surface level is due to redeposition after the prehistoric period.

The second profile (Figure 12) was collected from the same slough but at a point approximately 2.5 kilometers distant. The uppermost sample in this profile shows an unusually high frequency of arboreal pollen. Almost all of it is pollen of Salix and it undoubtedly indicates over-representation. The second level gave a spectrum similar to those of Pollen Zone I at the first locality. Below this and extending to a depth of about 36 inches the spectra are essentially similar to those of Pollen Zone II at the first locality. Below 38 inches, however, the percentage of Compositae pollen decreases and grass pollen is the only type which contributes more than 30 per cent to the profile. This change is considered sufficient for the establishment of Pollen Zone III.

The cultural material from this locality is modern brick, wood and metal. It will be noted that this refuse occurs at the top of Pollen Zone II. Old Village pottery was recovered from Pollen Zone II at the first locality.

The third profile (Figure 13) was collected about 200 meters from the first locality. Pollen Zones I, II and III are in evidence and in addition a Pollen Zone IV may be recognized. In this last zone the percentage of cheno-am pollen is greater than 30 per cent and the percentage of grass pollen is also 30 per cent. Old Village pottery was recovered in association with pollen spectra representing Zones II, III and IV. Thus if Old Village pottery represents a particular time phase in Mississippian culture history, the lowermost pollen spectra are not older than the oldest date which can be assigned to Old Village. Also, if the changes in the pollen profiles represent changes in environment, the Old Village phase of Mississippian culture is seen to have continued through at least three periods of different environmental conditions and two environmental changes.

Figure 14 shows the results of sediment samples collected at the Mitchell Site approximately 11 kilometers north of Cahokia. Because there is only a thin deposit of artifact-bearing alluvium, the samples were not collected in superposition. Thus we have no pollen profile, only a series of samples whose provenience is known relative to cultural remains.

A lake is located at the southern margin of the Mitchell Site. The three samples at the top of the diagram were collected from the soil surface along the lake shore. All show the characteristic features of Pollen Zone I. It is particularly interesting that the proportion of arboreal pollen is low in these samples, since the margin of the lake is densely wooded with willow, oak, elm, Prunus and other trees. Two of the three samples were from moss polsters growing at the roots of trees; the third was taken beneath oak leaf litter. None, however, shows more than 25 per cent arboreal pollen.

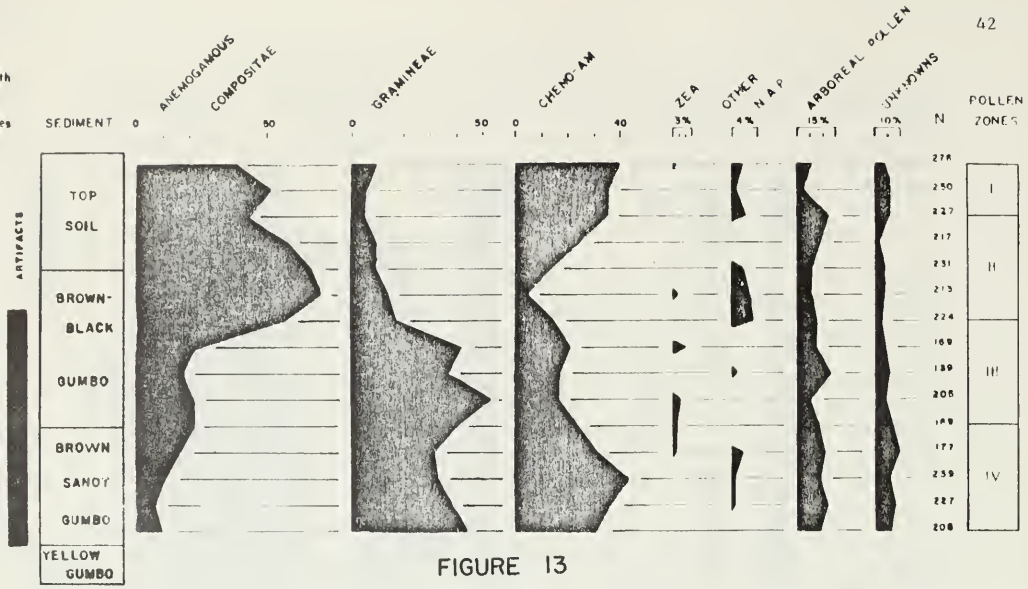

FIGURE 13

FIGURE 14

The next four samples were collected from the sediment surface a few centimeters beneath the waters of the lake. Of the four, two show the characteristic features of Pollen Zone I and two show those of Pollen Zone II.

Below this there are a group of samples from Mississippian architectural features, and the final group of samples was collected from the cultural sediment horizon but has no provenience relative to features. About half of the samples in these two groups show Zone II characteristics and about half show those of Zone III. Zone IV is not represented in the few samples so far processed from this site.

The recovery of consistent features of form and superposition in the three pollen profiles from Cahokia strongly suggests that environmental fluctuations have occurred. The recovery of similar pollen spectra from a site seven miles distant strongly suggests that these fluctuations were regional rather than local.

Two basic questions now present themselves:

First, what environmental changes seem evidenced by these data, and

Second, to what extent can the series of fluctuations be developed into an absolute chronology.

Today a large portion of the surface area of the American Bottoms is the water surface of lakes, ponds, swamps and sloughs--each with distinctive plant communities. Most timber is to be found along the water's edge, though fairly dense stands of temperate trees may be found as local remnants--most of them near houses or on terraces at the outer margins of the bottom land. But the ecological system of most of the surface of the American Bottoms is primarily influenced by man's industry. The majority of the land is either planted to maize and wheat or consists of fallow, weedy plots, roads, railway embankments and levees or house sites.

In the sense of being unforested, the region is a prairie; but because of the vast disturbance of the land by agricultural and earth-moving machinery, it is a prairie composed of crop plants and weeds rather than wild grasses. The most prevalent weeds are members of the Chenopodiaceae, Amaranthaceae and Compositae. This situation appears to be admirably reflected by the samples of Pollen Zone I (see Figure 13).

Because of the recovery of modern refuse in Pollen Zone II, we may be confident that Pollen Zone II ended after white settlement began in the area. Thus the boundary between Pollen Zones I and II must have been laid down less than 150 years ago. Surveyors' records of the 1830's and 40's indicate that at that time the region was mostly unforested, but the amount of surface area covered by swamps, sloughs and lakes was much greater. The surveyors' reports are quite valuable in reconstructing the ecology, for they describe conditions for 5 points within each square mile.

In order to improve the agricultural potential of the land, a great amount of filling and draining was undertaken during the last part of the

19th century and the 20th century. I believe that the cheno-am rise indicates sediment disturbance and thus that it is the combination of filling, draining and the general use of tractors after 1900 A.D. which accounts for the high frequency of cheno-am pollen in Zone I. Climatic fluctuation cannot be eliminated as a possible cause for the Zone II-Zone I shift, but in view of the present ecological situation it seems less probable.

I am tentatively dating the Zone I-Zone II boundary at 1900 ± 25 years A.D., but even if I am incorrect in this absolute date, the distinctive characteristics of Pollen Zone II must be a reflection of the ecological system in effect at the time of white settlement and before. The historic record describes this ecological system as "swampy prairie." Swampy prairie was a common form among the various prairie types found in Illinois which survived as relics and remnants into the 20th century when they were mapped and described by ecologists.

Through the pollen record of Zone II we can observe the presence, not to say the dominance, of pollen of the anemogamous Compositae on the American Bottoms in historic time. Yet in the vast majority of ecological descriptions of wet prairie types, plants of anemogamous genera are usually listed as rare if they are noted to occur at all: Sampson's ecological survey of the prairie communities of Illinois (1929) indicated that Ambrosia (the only anemogamous composite which he lists) is only to be found in xeric locales, though he concentrated on the prairies of the northeastern part of the state. I have been able to locate only one record of swampy prairie in which anemogamous composites played any important role. In 1930 Turner (1934) collected frequency curves on swampy prairie stations from the Illinois River valley and the Mississippi River valley. The basic difference in the floristics of the two areas was that on the floodplain of the Mississippi there was only one dominant plant: Spartina Michuaxiana Hitchc., or slough grass. But on the floodplain of the Illinois there were two dominants: slough grass and Iva ciliata Willd.--one of the anemogamous Compositae. Since we know from historic record that the region was swampy rather than xeric, it appears that the pollen record supports a reconstruction of an aberrant, but not unknown, prairie form in the American Bottoms at the beginning of white settlement.

In support of this reconstruction I correlated the frequency of occurrence per pollen zone of the non-arboreal swamp indicators Sparganium, Cyperaceae and Polygonum. Since the majority of the samples came from a known slough, it is not surprising that pollen of swamp indicators should be found in all zones, but it seems significant that it is more frequent from Pollen Zone II than any of the other zones.

What are the environmental conditions reflected by the pollen curves of Pollen Zone III? On the basis of the reduction of the Compositae curve and the reduced frequency of non-arboreal swamp indicators, I consider that Zone III represents a shift towards aridity relative to Zone II. I am extremely hesitant to make any definitive statements concerning temperature changes between Zones II and III, and in fact wish to refine and qualify my statement about a shift from wetter to drier conditions.

The use of non-arboreal pollen curves in the reconstruction of climatic conditions is, it seems to me, far more dangerous than the use

of arboreal curves. Because most of the non-arboreal vegetation is composed of species of annuals, the stand for any given year represents mainly the meteorological conditions of that year. The stand of arboreal vegetation, especially mature arboreal vegetation which releases pollen, represents climatic conditions for a reasonable length of time--at least a couple of decades and not uncommonly for some centuries. Thus when a change can be recognized in a pollen profile constructed on the basis of non-arboreal types, it must be recognized that the changes involved might well be those which are of little climatic significance. Also, it must be recognized that such changes could not represent more than conditions existing during the growing season. Throughout this paper I have refrained from mentioning climatic change in reference to the pollen chronology developed for the American Bottoms. I do this because I consider it quite injudicious to attempt to reconstruct climatic conditions when no data is available for the four or five months of the year when the non-arboreal flora is dead or dormant.

On the other hand, the inferences that may be derived from the study of the non-arboreal pollen curves should be far more sensitive for the growing season than inferences that may be derived from the arboreal pollen curves--because an environmental fluctuation of almost any kind, such as erosion, drought, flooding, cultivation or shortening of the growing season will probably be represented in the stratigraphic record if it persists for a decade.

This is exactly the type of environmental record which the archaeologist needs most desperately. For agricultural peoples such as those who dwelt in the Mississippian villages of the American Bottoms the basic question of economic survival was not whether the local ecology could support agricultural activity over the long time span of a climatic phase, but whether it could support agricultural activity of a certain level of yield year after year.

I believe the limitations of using non-arboreal pollen curves require me to discuss not a general change from drier to wetter conditions but a change from effectively drier to effectively wetter conditions during the span of the growing season. In discussing moisture reception in this region one cannot consider just rainfall, for the yearly spring flooding of the American Bottoms allows the effective moisture reception to be appreciably higher at that time than might be recorded in rainfall figures. It is possible to account for the change in the pollen record on the basis of a change in total annual moisture reception, but I think it can also be accounted for on the basis of a fluctuation in the periodicity of maximal moisture reception, and I consider that this latter alternative is more acceptable in regard to the type of data I have collected.

I believe that the difference between Zones II and III could be explained if Zone III was characterized as a phase in which the early part of the growing season was deficient in moisture reception, relative to Zone II, and the later part of the growing season was relatively superior in moisture reception. Turner's explanation of the growth of anemogamous Compositae in the Illinois River valley attributed this occurrence to the fact that there was poorer drainage there and the soil was saturated for a longer period during the growing season. Considering that grasses are,

a shift in the pollen record occurred also, but that the date of the shift was 1000 A.D. ± 100 years. Under no circumstances could the pollen representing the boundary zone have been laid down as late as 1200 A.D., and even 1100 A.D. would be an extreme date from my evidence.

I apologize that these data have not yet been published, but they are now in press and I have been assured that they will be out before the end of the year. To my knowledge this date of 1000 A.D. for the pollen fluctuation is the only one from the continent which can be said to have adequate documentation and precision for the time period of interest here. Other dates are based on radiocarbon determinations or on a guess correlation with the documented shifts in Greenland and Europe.

It seems a little anticlimatic to return to the pollen diagram at this point, but there is still Pollen Zone IV to be reckoned with. At present I am hesitant to make particular claims as to the validity of Pollen Zone IV as a representation of environmental conditions. Pollen Zone IV is found at only one locality and it is possible that it represents some local edaphic phenomenon and not a regional environmental one. It will be noted that its presence in the pollen profile is correlative with a layer of sandier sediment. I consider it quite possible that the increased percentage of cheno-am pollen reflects nothing more than the immense amount of sediment disturbance which may have resulted from the construction of mounds at Cahokia--perhaps Monks Mound which is only a couple of hundred meters distant.

The dating of the Zone III-Zone IV boundary is an unresolved matter, as is the dating of the base of this pollen profile. I can only say at present that the chronology is no older than the oldest date that can be assigned to Old Village pottery. According to archaeological estimates now prevalent this would be about 700 A.D.

In summary, the oldest date that can be as yet assigned to the pollen chronology from the American Bottoms is in the neighborhood of 700 A.D., thus the chronology goes back, roughly, 1500 years at most. All pollen zones show a primarily non-forested, or prairie, ecology though this is recognized as having undergone changes through time which may have had significant effects on the cultural phases of the area. The lowermost pollen zone may either be a local or a regional phenomenon. It appears to indicate a phase of sediment disturbance, but this could be due to cultural as well as ecological-edaphic factors. The upper three zones of the pollen chronology seem to reflect regional ecological occurrences, since they can be reproduced at localities up to 11 kilometers distant.

Pollen Zone III, which may end at 1000 A.D., seems to reflect a relatively more arid environment. The shift from more arid to more moist conditions at the end of Pollen Zone III may be only a shift in the timing of moisture reception during the growing season and not a basic change in the climatic configuration of the American Bottoms region. Pollen Zone II dates from approximately 1000 A.D. to 1900 A.D. in my opinion. It is relatively more moist than the lower zones and seems to correctly answer descriptions of the area recorded during the early historic period. The uppermost pollen

zone shows indications of sediment disturbance. From stratigraphic and ecological knowledge of this zone it evidently reflects the recent disturbance of the ecological balance of the region by mechanized agriculturalists.

VII

RADIOCARBON ASSAYS

by

Melvin L. Fowler

Listed in the following section are the radiocarbon assays of age received to date on samples submitted under this project. All samples were collected in the field specifically for this purpose. All were submitted to the University of Michigan Phoenix Memorial Project Laboratory for assay.

Summary data on each of these lists are presented in the reports of the sub-projects above. In those reports the age estimates were given in terms of one standard deviation and the time range (one standard deviation) involved in years A.D. This range was obtained by subtracting the years B.P. from 1960. In the lists below both the before-present mean and the range in the years A.D. will be listed. The detailed descriptions of each sample are also given in this section.

University of Illinois Samples

Ms-2-2, subseries

Location (38° 39' 46" N. Lat., 90° 05' 17" W. Long.) ca. 200 yards NE of the old Powell Mound area and 2 miles west of Monks Mound, Madison County, Illinois.

	B.P.	Range Years A.D.
M-1292 Powell-Zurkuhlen Site, Feature 234, House 26	1055±150	755-1055

Charcoal from charred layer on the floor of a rectangular wall trench structure (Fea. 234). Long axis of structure oriented NW-SE. Associated with Mississippian occupation at the site. Sample No. IAS-11; coll. 1960 by Charles J. Bareis.

M-1293 Powell-Zurkuhlen Site, Feature 227	1190±150	620-920

Charcoal from fire basin (Fea. 227) ca. 9' in diameter located near the center of a large rectangular wall trench structure (Fea. 202, House 15) with the long axis oriented NE-SW. Both features associated with the Mississippian occupation at the site. Stratigraphic evidence indicates, however, that M-1293 should be later than M-1292 and M-1294. Sample No. IAS-12; coll. 1960 by Donald W. Lathrap.

	B.P.	Range Years A.D.
M-1294 Powell-Zurkuhlen Site, Feature 217, House 21	1125±150	685-985

Charcoal from the floor of a rectangular post structure (Fea. 217). Long axis of the structure oriented NW-SE. Although the method of construction is of the Bluff or Late Woodland type, Mississippian pottery was present on the floor of this structure. Sample No. IAS-13; coll. 1960 by Charles J. Bareis.

M-1295 Powell-Zurkuhlen Site, Feature 197	1915±150	105B.C.-195A.D.

Charcoal from a charred area (Fea. 197) in Square J-1-36, level 6 (depth 31 inches). A large post structure and a wall trench structure (both associated with the Mississippian occupation at the site) were located nearby approximately .6'-.9' above Feature 197. M-1295 is too early for the Mississippian occupation at Cahokia but may indicate the time of the beginnings of the Late Woodland occupation. This sample may have been contaminated. Sample No. IAS-14; coll. 1960 by Donald W. Lathrap.

S-34-1, subseries

Location (38° 39' 21" N. Lat., 90° 03' 15" W. Long.) at west border of Collinsville Airport property and ca. ½ mile SE of Monks Mound, St. Clair County, Illinois.

M-1296 Collinsville Airport Site, House 3	725±150	1085-1385

Charred wood from top of west wall of rectangular wall trench structure (House 3). Long axis of structure oriented N-S. Associated with Mississippian occupation at the site. Sample No. IAS-15; coll. 1961 by Charles J. Bareis.

M-1297 Collinsville Airport Site, Feature 1	675±150	1135-1435

Charcoal and charred corn from a large refuse pit (Feature 1), non-stratigraphic cut. Associated with Mississippian occupation at the site. M-1296 and M-1297 date the latest occupation at IAS-16; coll. 1961 by Charles J. Bareis.

Southern Illinois University Museum Samples

Mitchell Site Series, Illinois

Vegetable matter from various locations at the Middle Mississippian Mitchell Site (20B2-3), Madison County, Illinois. Submitted by James Porter, Southern Illinois University, Carbondale, Illinois. A report on the site is in progress.

	B.P.	Range Years A.D.
M-1298 Mitchell Site, Mound B	785±150	1025-1325

Charred wood (wall post or roof support) from a burned structure, Feature 44, on top of Mound B. Coord. 38° 45' 28" N. Lat., 90° 05' 27" W. Long. Sample thus represents latest occupation of Mound B. Stratigraphic evidence indicated that M-1298 should be later than M-1299. Sample No. IAS-21; collected October, 1960, by Eugene Fugle.

M-1299 Mitchell Site, Pre-Mound B	875±150	935-1235

Charred wood (roof support) from house floor at NE corner of early ceremonial structure found under west flank of Mound B. Coord. as M-1298. Sample associated with Feature 32. Sample No. IAS-22; collected October, 1960, by James Porter.

M-1300 Mitchell Site, Mound C	785±150	1050-1325

Charred bits of twigs from refuse pit in north profile of 320 test trench, between L61-62, at 58-93 cm below the surface. Coord. 38° 45' 30" N. Lat., 90° 05' 27" W. Long. Dates occupation of Mound C (only occupation) and should be contemporaneous with M-1298. Sample No. IAS-23; collected October, 1960, by James Porter.

M-1302 Mitchell Site, Mound H	750±150	1060-1370

Charred wood from dark fill over Features 77 and 79, 0-20 cm above "floor," Mound H area. Coord. 38° 45' 27" N. Lat., 90° 05' 21" W. Long. Should date period between destruction of Features 77 and 79 and the last occupation of Mound H. Sample No. IAS-25; collected August, 1961, by Alan Harn.

M-1303 Mitchell Site, Mound H	950±150	860-1160

Charred wood from near S. wall trench of Feature 77, 5 cm below datum. Coord. as M-1302. Dates occupation of pre-mound H buildings. Sample No. IAS-26; collected June, 1961, by James Porter.

	B.P.	Range Years A.D.
M-1304 Mitchell Site, Feature 28	785±150	1025-1225

Charred wood from Feature 28, SW corner, 60-67 cm below surface. Coord. 38° 45' 35" N. Lat., 90° 05' 30" W. Long. Dates N. area of site for comparison with mound samples. Sample No. IAS-27; collected September, 1960, by Vincent Foley.

M-1305 Mitchell Site, Feature 50	1000±150	810-1100

Air-dried sample taken from between inner and outer rings, in middle area of large bald-cypress log, found in Feature 50, 3.6 meters below surface but above water table. Coord. 38° 45' 30" N. Lat., 90° 05' 21" W. Long. Sample No. IAS-28; collected July, 1961, by Peter Taylor.

M-1306 Mitchell Site, Feature 62	395±150	1415-1715

Charred corn from fill of pit (Feature 62) in Mound H, 15-40 cm below surface. Coord. same as M-1303. Dates last occupation of Mound H; should post-date three earlier ceremonial structures (Features 47, 77, 79). Sample No. IAS-29; collected July, 1961, by Alan Harn.

Fill Site Series, Illinois

Samples from the Fill Site (20 B2-5; 38° 45' 24" N. Lat., 90° 05' 30" W. Long.), Madison County, Illinois. Collected October, 1960, and submitted by James Porter, Southern Illinois University, Carbondale, Illinois. Samples were collected under pressure of highway construction, and no exact provenience data is available. Samples should date occupation of site, thought to be contemporary with last occupation of Mitchell Site (Middle Mississippian, from late Old Village to early Trappist).

M-1301 Fill Site	910±150	900-1200

Charred branches and thatch from burned house uncovered by bulldozers. Sample (IAS-24) from approximately 50-80 cm below surface.

Illinois State Museum Radiocarbon Dates

Cahokia Series

Charred wood from structures in Tract 15B, SE¼, SE¼, SW¼, Sec. 35, T3N, R9W (38° 39' 36" N. Lat., 90° 03' 57" W. Long.), Madison County, Illinois. Collected in September and October, 1960, by Warren L. Wittry, Illinois State Museum. Submitted by Warren J. Wittry.

	B.P.	Range Years A.D.
M-1332 (IAS-1) House 43	515±100	1395-1545

Rectangular, trench wall, 22 x 24 feet, N-S, 528 sq. ft. area. Late Mississippian. Pottery: Cahokia Cordmarked, uncl. beanpot, Mound Place Incised, undec. plate, Monks Mound Red, uncl. water bottle, Cahokia Red Filmed, St. Clair Plain, uncl. grog-tempered ware. Charred timbers on floor, 1.3 feet below surface and 0.4 feet below plow zone.

M-1333 (IAS-2) House 44	825±100	1035-1235

Rectangular, single-post wall, 10.5 x 14.5 feet, E-W orientation, 152 sq. ft. area. Late Bluff. Sample from central floor area, 1.8 feet below surface and 0.9 feet below plow zone.

M-1334 (IAS-3) House 59	385±90	1485-1665

Rectangular, trench wall, 19 x 25 feet, N-S, 475 sq. ft. area. Late Mississippian. Pottery: Cahokia Cordmarked, Wells Incised, uncl. beanpot, undec. plate, Cahokia Red Filmed, St. Clair Plain, effigy form, uncl. grog-tempered ware. Sample from floor of house, 1.7 feet below surface and 0.8 feet below plow zone.

M-1335 (IAS-4B) House 77	765±200	995-1345

Rectangular, single-post wall, 9 x 11.5 feet, E-W orientation, 104 sq. ft. area. Late Bluff. Pottery: uncl. Bluff, Monks Mound Red. Sample from floor to 1.0 feet above floor.

M-1336 (IAS-5B) House 113	885±200	875-1275

Rectangular, single-post wall, 8.5 x 13 ft., E-W orientation, 110 sq. ft. area. Bluff. Pottery: incl. Bluff, Monks Mound Red. Sample from 1.0 to 1.5 ft. below plow zone.

Charred wood from structures in Tract 15A, SE¼, SE¼, SE¼, Sec. 34, T3N, R9W (38° 39' 36" N. Lat., 90° 04' 27" W. Long.), Madison County, Illinois. Collected in June and July, 1961, by Warren L. Wittry, Illinois State Museum. Submitted by Warren L. Wittry.

M-1337 (IAS-6) House 2	805±100	1055-1255

Rectangular, trench wall, 15 x 19 feet, N-S, 285 sq. ft. area. Early Mississippian. Pottery: Monks Mound Red, uncl. water bottle, Cahokia Red Filmed, effigy form, Ramey Incised, Powell Plain, St. Clair Plain, uncl. Bluff, uncl. grog-tempered ware. Burned posts in wall trench.

		B.P.	Range Years A.D.
M-1338 (IAS-7)	House 32	725±100	1135-1335

Rectangular, trench wall, 16 x 30 feet, E-W, 480 sq. ft. area. Early Mississippian. Pottery: Monks Mound Red, uncl. water bottle, Cahokia Red Filmed, Ramey Incised, St. Clair Plain, uncl. Bluff, uncl. grog-tempered ware. Sample from 0.2 feet above floor, 1.7 feet below surface.

M-1339 (IAS-8)	House 35	685±100	1175-1375

Rectangular, trench wall, 14 x 19 feet, E-W, 266 sq. ft. area. Late Mississippian (?). Pottery: Cahokia Cordmarked, Wells Incised, undec. plate, Monks Mound Red, uncl. water bottle, Chaokia Red Filmed, Ramey Incised, St. Clair Plain, uncl. Bluff, uncl. grog-tempered ware. Sample from 0.3 feet above floor and 1.7 feet below surface.

M-1340 (IAS-9)	House 74	1025±110	825-1045

Rectangular single-post wall, 6 x 10 feet, N-S, 60 sq. ft. area. Bluff. Pottery, uncl. Bluff, Monks Mound Red. Floor level to 0.3 above floor (1.2-1.5 feet below surface) for sample.

M-1341 (IAS-10a+10b)		905±120	935-1175

Post-circle 480 feet in diameter. Probably Early Mississippian. Sample from fill of Feature 174, 0.9 to 2.3 feet below surface.

The descriptions of the Cahokia samples were supplied by Robert Hall of the Illinois State Museum.

Comments on Assays

In each of the above series there are what appear to be aberant dates that clearly fall outside the range of the bulk of the dates for those sites. These will be discussed below and reasons given for their elimination as samples in the statistical averaging.

Sample M-1295, Powell-Zurkuhlin Site

This assay is obviously much earlier than any of the other dates determined for this site. Even with a two-sigma range of variation, it does not overlap with any of the other samples. It probably represents material from an earlier occupation of the site.

Sample M-1306, Mitchell Site

This sample is much more recent than any of the other assays from the Mitchell Site. Using two standard deviations, it

overlaps somewhat in range with the next most recent dates. Due to the location from which it was collected, there is a good probability that this was a contaminated sample or represents a very late occupation of the site.

Sample M-1305, Mitchell Site

This sample was from the central portion of a large cypress log so that the assay represents the age assay for the inner rings. There were approximately 150 growth rings apparent. The outer rings would be the ones most significant for comparison with the age assays determined from the other samples. Therefore, I am subtracting 150 years from the central range of 1000 years determined for this sample. In the statistical analysis, I will use the age of 850 years ago ± 150 years. We plan to submit samples from the inner and outer growth rings of this log for checking; and until these tests are run, this dating should be considered as temporary.

The following table shows the averages of the samples used in this statistical analysis both in terms of B.P. dates and in terms of range of years (one standard deviation), A.D. using 1960 as a reference point.

Site	Sample Numbers	Years B.P.	Range in Years A.D.
Powell-Zurkuhlin	1292, 1293, 1294	1125 ± 87	748 to 922 A.D.
Mitchell	1298, 1299, 1300, 1302, 1303, 1304, 1305	822 ± 57	1081 to 1195 A.D.
Collinsville Airport	1296, 1297	700 ± 106	1154 to 1366 A.D.

Visual observation of the above data indicates that the Powell-Zurkuhlin area was occupied earlier than the Mitchell area. There is no overlap between the two sample averages even if a two-sigma range is used. Analyzing these data on the basis suggested in Johnson (1951:58), we find that the difference between the two averages is 303 years and the error of the difference (the square root of the sum of the squares of the two individual errors) is 104 years. Thus, the difference between the two sample averages is 303 ± 104 years. The difference is nearly three times as great as the range of error. For such a three-sigma range, we are 99.7 per cent sure that the two averages are significantly different.

For the average of samples from Mitchell and the Collinsville airport site, visual inspection indicates their near contemporaneity. Statistically, the difference between the two samples is 122 ± 118 years. Thus, these two samples are probably, or roughly, contemporary, with the possibility that the Mitchell series is somewhat older.

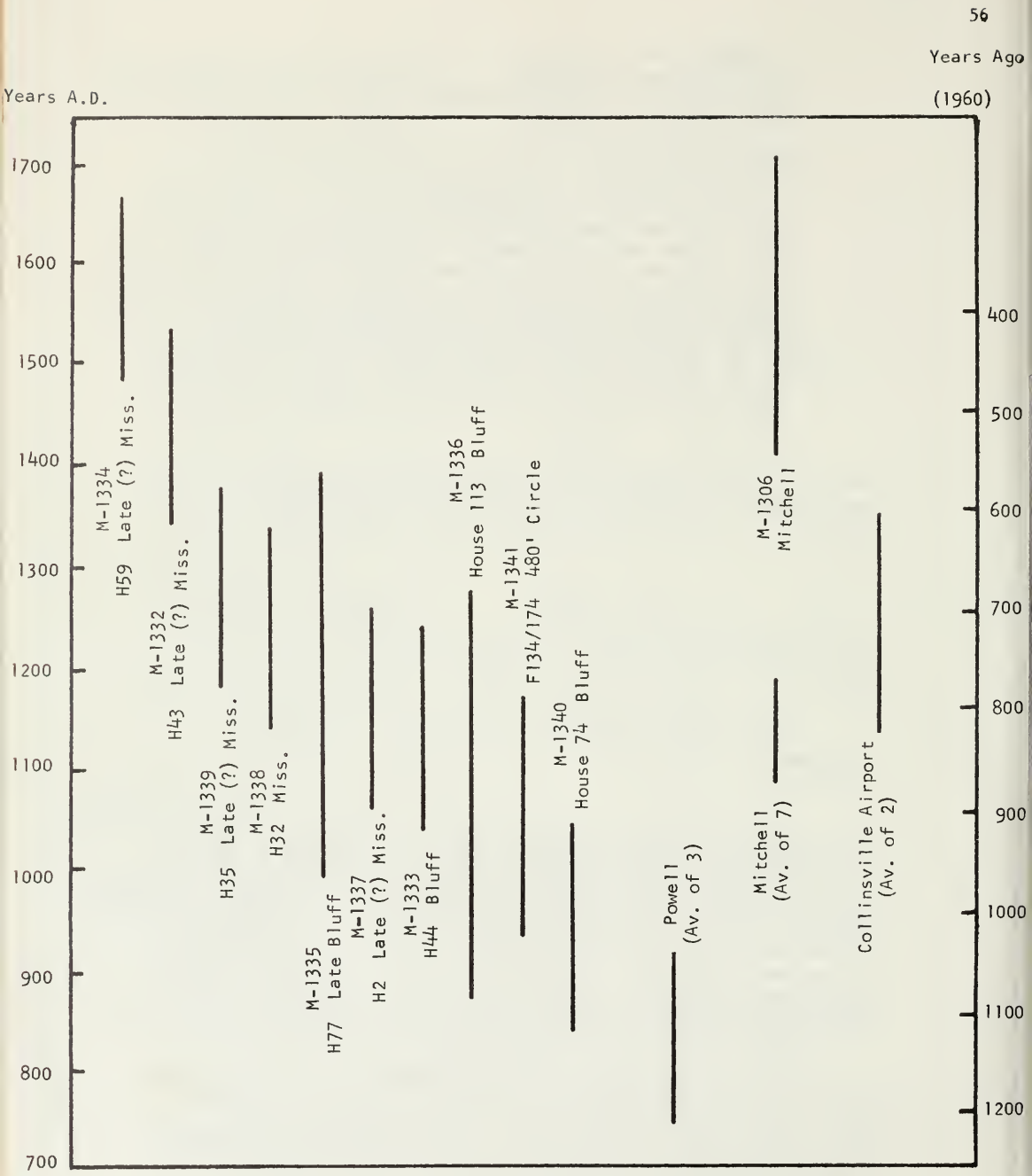

FIGURE 15

Ranges (1 sigma) of radiocarbon assays from the Cahokia area.

The radiocarbon assays from the Cahokia area itself (Tracts 15A and 15B) present quite a different picture. There is no tight clustering of the data, but rather there is a great spread in range from 385 ± 90 years ago to 1025 ± 110 years ago and what appears to be an even distribution over this range. For example, the range of the Mitchell dates, disregarding M-1303, is from 785 ± 150 years ago to 950 ± 150 years ago. The difference between these two extreme dates from Mitchell is 165 ± 225 years indicating the strong probability that all of these assays are contemporaneous. Even if one takes only those dates from Cahokia that were culturally labeled "Late Mississippian," M-1337, M-1339, M-1332, and M-1334, one finds that the difference between the two extremes of this is 420 ± 131 years and that this indicates these dates statistically are significantly different. What the Cahokia dates suggest is a long range of occupation of the site areas through time.

The earliest portion of this Cahokia range (see Figure 15) seems to overlap with the time range suggested for the Powell-Zurkuhlin area. Thus, if sample M-1340 is compared with the average for the Powell area, we find that the difference between the two is 100 ± 140 years, thus suggesting that these two dates are roughly contemporary.

The middle portions of the Cahokia range correspond well with the time suggested for the occupation of the Mitchell Site. The upper end of the range coincides with the dating of the occupation of the Collinsville airport site and the one late date from a pit on top of Mound H of the Mitchell group. The fact that a correspondingly similar date was found at Cahokia suggests that the sample from Mitchell (M-1303) may actually represent a cultural occupation rather than contamination from other sources.

Taken altogether, these radiocarbon determinations suggest that the Mississippian occupation of the American Bottoms region began about 800 A.D. The radiocarbon data are not clear enough at the present time to determine if the "Bluff" occupation was contemporary with the early Mississippian or preceded it in part. The present radiocarbon data suggest contemporaneity, but these data remain for detailed analysis in terms of the archaeological associations involved before more can be said on this question. This is one problem where further radiocarbon analysis would be helpful. A series of samples collected from "pure" Bluff houses would be important ones to assay.

The data indicate a very late Mississippian occupation of the area, lasting into the 16th century, and more samples could profitably be submitted dealing in detail with this little known end of the time range.

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